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THE JOURNAL OF THE DEPARTMENT OF AGRICULTURE OF VICTORIA, AUSTRALIA.

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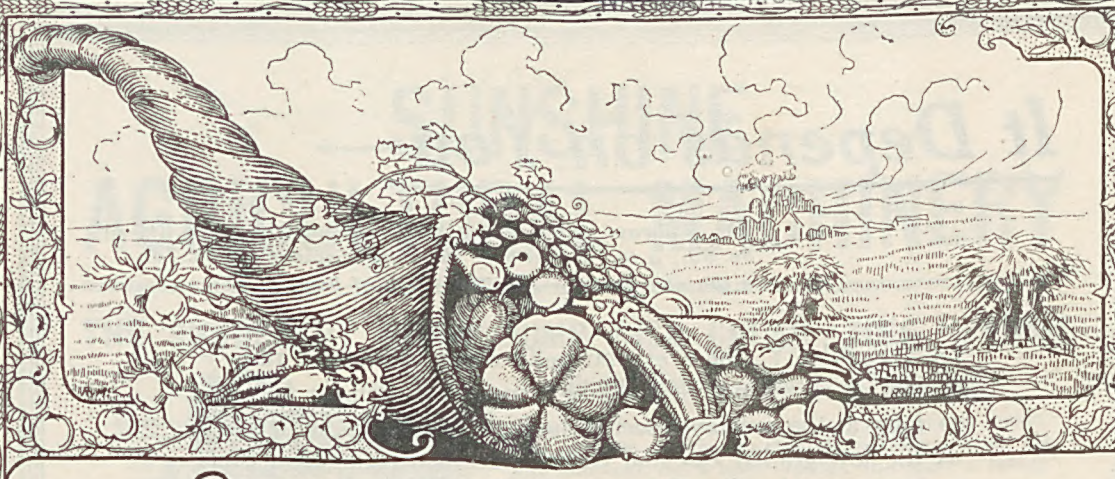

Contents. MARCH, 1931.

		PAGE
Review of Departmental Organization and Functions	*S. S. Cameron, D.V.Sc.*	105
Pasture Management	*H. A. Mullett, B.Agr.Sc.*	116
Overseas Gifts Scheme		121
Packing Fruit for Export	*B. Krone*	124
Home Curing of Bacon	*H. C. Churches*	129
Target Spot of Tomatoes	*S. Fish, M.Agr.Sc.*	132
The F.A.Q. Wheat Sample	*W. R. Jewell, M.Sc., F.I.C.*	134
Orchard and Garden Notes	*E. E. Pescott, F.L.S.*	135
Fertilizer Inspections	*W. C. Robertson*	136
Professional Papers—		
Control of Loose Smut in Wheat	*D. B. Adam, B.Agr.Sc., and R. T. M. Pescott, M.Agr.Sc.*	141
Rose Diseases and their Control	*B. J. Grieve, M.Sc.*	146
Standard Herd Records for Quarter ended 31st December, 1930		150

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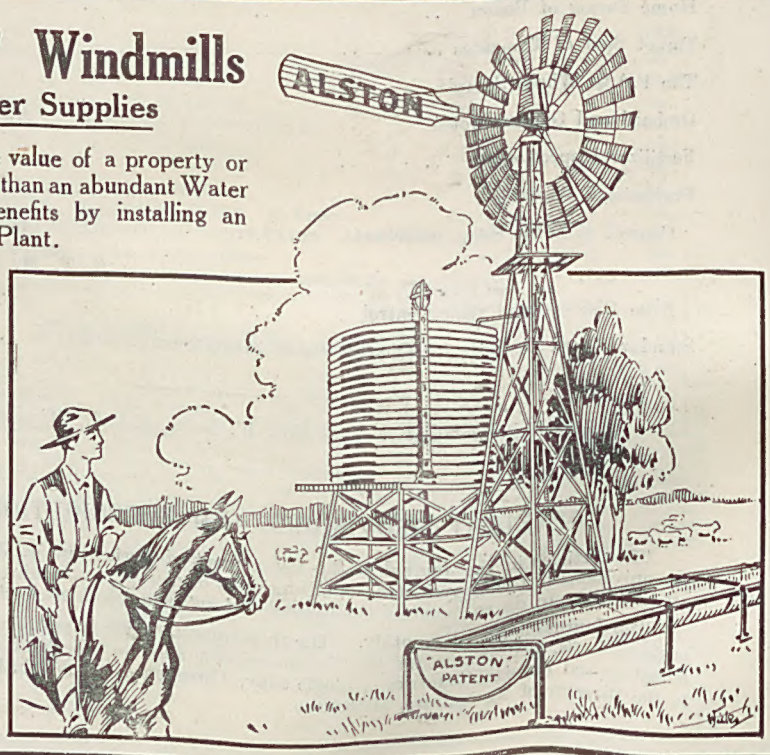

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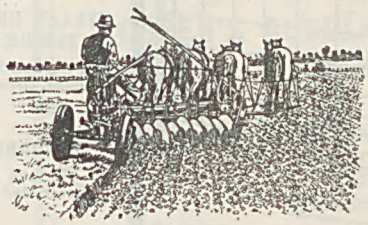

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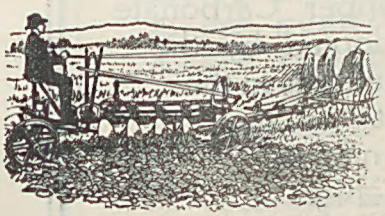

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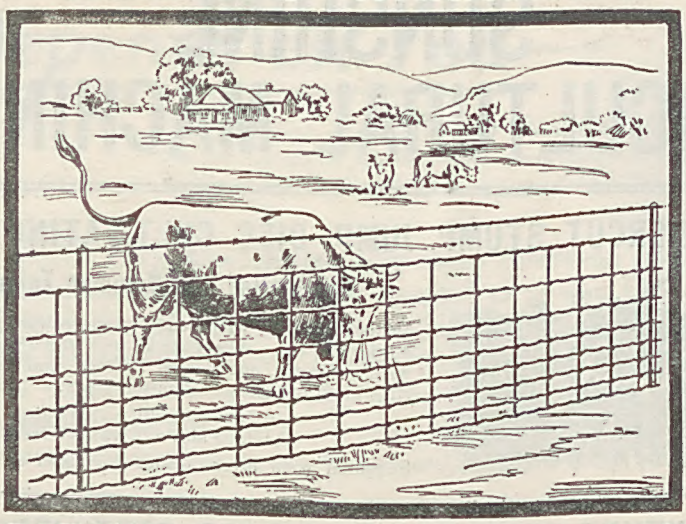

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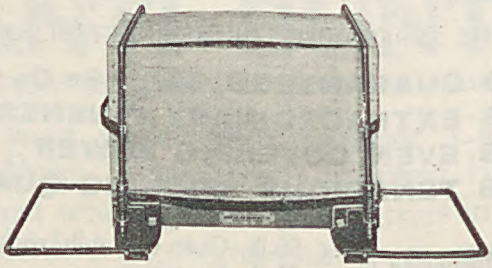

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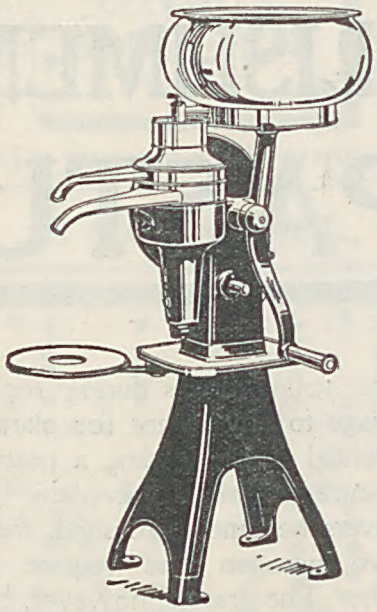

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The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

The Department of Agriculture

A Review of the Organization and Functions of the Horticultural and Produce Divisions

By Dr. S. S. Cameron, Director of Agriculture

(This article concludes Dr. Cameron's review of the organization and functions of the Department of Agriculture. In the January and February issues the Head Office administration, Agricultural, and Live Stock Divisions were dealt with.)

THE HORTICULTURAL DIVISION.

AS far back as the nineties of last century and as an outcome of a Royal Commission on vegetable products, legislation has been in existence for the purpose of controlling fruit tree and other plant diseases. Phylloxera of vines, codlin moth and other diseases and pests of edible fruits, have needed a small inspectional staff, which, with expert specialists such as Francois de Castella, Viticulturist, and Messrs. J. Cronin, J. G. Turner, and P. J. Carmody, was welded to form the Horticultural Branch of the Agricultural Division in 1911. As the irrigation and closer settlement policies developed in the scheme of expansion of Victorian land resources, the need for systematized guidance of fruit-growers was gradually emphasized, and both the inspectional and educational services were expanded to keep pace with the developing areas. By 1923 the importance of this departmental activity had become such as to justify the establishment of a separate division of the departmental organization, and the Horticultural Division was created in January, 1924, with Mr. J. M. Ward, Superintendent of Horticulture, as divisional head. Mr. Ward was familiar, through personal visits, with fruit-growing in California and other American States, and had previously had horticultural administrative experience as chief of the Tasmania and Queensland Government horticultural organizations.

Orchard Supervision and Fruit Inspection.

Orchard Supervision is carried out in twelve districts, each controlled by a supervisor. These officers perform inspection duties under the Vegetation Diseases Act, and also act as instruction and demonstration officers. This work is directed by the Chief and Senior Orchard Supervisors, Mr. H. W. Davey and Mr. A. A. Hammond, through whom the supervisors are kept in touch with the work proceeding at the Plant Research Laboratory, Burnley Gardens, and that of the horticultural and cool storage research staff. By this personal contact, orchardists receive the best information available relative to planting, cultural, and fertilizer treatment, pruning, budding, grafting, interpollination, and the like matters, and to the methods of prevention and treatment of fruit tree diseases and pests and other such problems.

Mr. J. M. Ward,
Superintendent of Horticulture.

Fruit Inspection. — A staff of thirteen fruit inspectors is needed to conduct the inspection of fruit for export and imported fruit. For export overseas all fruit must comply with certain conditions, provided in the Commonwealth Commerce Act, as to quality, grade, variety, freedom from disease, packing, and casing. In addition, countries and States receiving our fruit exports impose conditions which it is the duty of the inspectors to see are being complied with, so that there may be no hitch at the landing port. Again, contracts of sale of certain fruits or vegetables for export may be made on the basis of a Government certificate being final as regards quality or other condition, and the inspectors accordingly are required to grant or refuse certification after inspection. As regards fruit, vegetables and such like imported to this State, inspection is required to ensure that statutory provisions designed to prevent introduction of disease are being complied with, and that the imports conform with contract and quality standards.

Inspection of fruit for sale in markets and shops is undertaken by three market inspectors, whose duties ensure compliance by vendors with the provisions of the vegetation diseases and fruit-topping sections of the Fruit and Vegetables Act.

Officers of this division at present undertake inspectional duties in respect of timber imports and also administer the Pure Seeds Act and the regulations relative to imported seeds under the Commonwealth Quarantine Act.

The work of the fruit inspection staff is superintended by the veteran Senior Inspector, Mr. E. Meeking, whose life-long effort of helpfulness to fruit-growers was manifested recently in a singular manner. During a private visit to Europe last year he undertook, at the instance of the Agent-General, but entirely at his own expense and without recoup, special visits to Glasgow, Liverpool, and Hamburg, to inquire into certain phases of fruit marketing. On his return to Melbourne he prepared an extremely valuable report on his observations and inquiries relative to fruit packing and fruit marketing practices in the countries visited. This report has received the highest encomiums from the many lecture audiences to whom he has gratuitously imparted his gathered information.

Fruit Packing.—The almost universal condemnation which is charged to fruit-growers for careless packing and casing of their products cannot be lightly thrust aside. The obligation on growers is not only to meet market requirements with well-grown high-quality fruit, but also to see to it that their fruit is advantageously and attractively packed and cased. With the object of assisting fruit-growers to attain proficiency in fruit packing the Department in 1924 appointed Mr. B. P. Krone as Fruit Packing Instructor, and from time to time has supplied one or two assistants to help in carrying out an adequate programme of instructional demonstrations.

Viticulture.

Vine growing for table grapes, dried fruits, and wine production has been a particular care of the Department for many years. Under the enthusiastic attention of the present widely and favorably known Viticulturist, Mr. Francois de Castella, and his predecessors (Messrs. Bragato, Dubois, and Burney), excellent results have been achieved. Perhaps the most outstanding of these has been the success in controlling the spread of the phylloxera disease and the entire reconstitution with phylloxera-resistant vines of the whole area of phylloxerated vineyards in the famous Rutherglen wine district. This is no mean achievement, and it would have been impossible but for the action of the Department in raising and distributing phylloxera-resistant grafted stocks and rootlings to vignerons at approximately one-fourth of the cost of production. From 100,000 to 500,000 of resistant stocks grafted with scions of the most suitable grape varieties have been distributed annually over the 25 years it has taken to effect the reconstitution of the Rutherglen vineyards. This markedly successful instance of parental care by a Government of an important primary industry when in distress has been well worth while, for Australian wines of full-bodied type, and particularly Ruther-

glen wines, stand high amongst their competitors in the estimation of English and continental connoisseurs and command ready sale; so has been saved to Victoria a present prosperous and potentially an exceedingly valuable agrarian industry.

Rutherglen Viticultural Station.—This institution, situated about 3 miles outside the town of Rutherglen, was established about 30 years ago as a Viticultural College. It failed to attract many students, and the teaching curriculum was quickly abandoned. It then became the centre of the phylloxera reconstitution work, and under the control of Mr. de Castella an area of 25 acres has been devoted to experimental work on wine-making varieties of grapes. Imported varieties are grown to maturity, and wines produced in the model wine cellars are compared with standard types. The results are demonstrated on visitors' days, which are held annually and attended by large numbers of interested growers and the representatives of wine-making firms. By this means many improved varieties, which have helped in the establishment of our high reputation, have been introduced. From fifteen to twenty boys selected by the Children's Welfare Department are in residence at the station and receive training over three years in routine vineyard work, vine grafting, &c.

Wahgunyah Vine Nursery.—Situated on the banks of the Murray River at Wahgunyah, this nursery is an out-station of the Rutherglen station. Having suitable river silt soil an irrigation plant is installed, which ensures robust growth to maturity of the phylloxera-grafted stocks. Grafting sheds and other appurtenances of the phylloxera reconstitution work are in use, and the grafted stocks are distributed from this centre. In recent years the raising of tobacco plants for distribution to growers has been undertaken, and an area has been utilized for tobacco variety and fertilizer experiment plots.

Citriculture.

The Citriculture Branch comprises Mr. S. A. Cock, Citriculturist, and four assistants. This rapidly developing branch of horticulture is receiving close attention in order that the most approved methods may be followed. Much instruction is given by personal contact, lectures,

The Horticultural Car—Better Farming Train.

broadcasting on soils suitability, stocks, budding, cultural and fertilizer methods, picking, packing and transport, and marketing. Fumigation of citrus groves with hydrocyanic acid gas for the suppression of scale infection is provided for by six departmental outfits, which operate during the suitable season in different districts under a system of contract payment by the grove owner.

Horticultural Research.

During the last three years a small staff, comprising Mr. F. M. Read, M.Sc.(Ag.), Mr. A. G. Strickland, M.Sc.(Ag.), and Mr. J. L. Provan, B.Sc.(Ag.), has been constituted to engage on problems of the fruit-growing industry of a non-pathological character. Mr. Read had previously been engaged on soil alkali investigations, particularly in connexion with citriculture, his field work done at Tresco being correlated with laboratory work at the University School of Agriculture. This work is to be continued by Mr. Read in co-operation with Professor Prescott, Director of the Soil Laboratory at the Waite Institute, Adelaide, South Australia.

The programme of work in hand by these officers includes—

1. Fertilizer Trials.—Field work on apples at Lower and Upper Beaconsfield, Red Hill, and Harcourt, and on vines at Rutherglen.
2. The problem of biennial bearing and the relation of fertilization, pruning practices, nutritional and other factors thereto.
3. Bud selection and stock problems in citrus culture.
4. Pollination problems.
5. Fruit Storage and Transport.—The research staff is co-operating with the Commonwealth Council of Scientific and Industrial Research in the investigation proceeding on the problem of citrus preservation.
6. Viticultural Research.—Affinities, reciprocal suitability of stock and scion, adaptation of stock and soil, ampelographical investigations, &c.

An area of 100 acres of suitable land was acquired in 1929 at Tatura in the Goulburn Valley for the purpose of establishing a horticultural research station. Unfortunately, financial exigencies have prevented other than preparatory work being undertaken so far, and it is possible that two or three years of postponement will have to be endured before the contemplated field research programme can be entered on.

THE PRODUCE DIVISION.

Recognition of the necessity that the produce of the farm needed facilities for its proper care and disposal after it left the farmer's hands led to the creation of the Produce Division on the departmental reorganization in 1911. The division exists to render assistance to the farmer in the transport, storage, and sale of farm produce. Duties are taken up and extended at the point where those of the other divisions—Live Stock, Agriculture, and Horticulture—leave off.

Mr. R. Crowe, Exports Superintendent.

Successful trade in farm produce within the State, between the States, and overseas rests upon the dependability of the article sold to meet the expectations and requirements of the purchaser. The raw product of the farm cannot be tossed to the consumer in the state it is developed to by mother earth. Varying qualities must be differentiated and preparation processes undertaken, and the Produce Division sees to it that standards of grade and quality are complied with, and that manufacture or other preparation is performed to the best advantage of both producer and consumer. Again, as with the other divisions, the functions of this Produce Division are both educational and restrictive; some are performed as administrative acts, others require the exercise of statutory powers such as are conferred by the Exports Produce Act, the Farm Produce Agents Act, and the Milk and Dairy Supervision Act (Part I., Dairy Produce Act consolidation).

Government Cool Stores.

Situated alongside the wharfs at Victoria Dock, these stores constitute a major instrumentality in the service given by the Produce Division. The present stores were built during 1913-14 after some years of persistent advocacy

Train Load of 32 Trucks containing 15,312 boxes of Frozen Butter being taken from the Government Cool Stores for shipment overseas.

of the project by Mr. Robert Crowe, Exports Superintendent. As far back as 1889, when the "butter export bonus" had been piloted through Parliament by the late Hon. J. L. Dow, Minister for Agriculture, the Government of the day rented the Newport Freezing Works to provide exporters of butter with cool storage facilities prior to shipment. After two years' occupancy a move was made to the Melbourne City Council's City Markets in Flinders-street, where a refrigeration plant meanwhile had been installed.

During the 23 years tenancy by the Department of the Municipal Cool Stores they became the nursery for the development of Victoria's trade in exportable perishable produce. Practically all exporters who have engaged in the perishable produce export trade have made their initial essays through the departmental stores, thereby laying the foundation of many of the firms and organizations which now operate Victoria's butter, meat, fruit, poultry, rabbits, and egg exports.

As freezing works and cool stores became established by private firms and companies opinion developed in certain quarters that the Department should withdraw from the business. The then Treasurer, the Rt. Hon. W. A. Watt, answered with a firm "No, an 'open channel' must be kept as in the past for all who wish to 'try out' an export venture," and he affirmed Mr. Crowe's long-fought-for plan. The wisdom of this decision was amply manifested by the service to primary producers which the stores rendered during the War.

The Victoria Dock Stores occupy an area of 11 acres. The original buildings were completed in 1914 with an insulated capacity of 310,000 cubic feet at a cost of £90,861. During the War, and particularly during the "submarine menace" period, owing to the scarcity and disorganization of shipping it became necessary to make additions in order to provide for the accumulations of butter, meat, and other perishable produce. It was at this time that the wisdom of Mr. Watt's policy was demonstrated. The dairy industry was protected and the live stock markets held firm by the facilities so provided to store produce that could not be shipped. But it was touch and go business. Oftentimes, as the building extensions were being rushed, the cool chambers were full to within a couple of days' killing or milking tally when a refrigerated steamer would loom up through the mists of Port Phillip and relieve the pressure. Apart from export business the stores are much availed of for storing butter, cheese, meat, fruit, poultry, eggs, rabbits, &c., during periods of plenty to supply the local market with adequate supplies at reasonable prices during subsequent periods of scarcity.

The wartime extensions cost £232,832, bringing the total cost to £323,693 and the storage capacity to 1,380,000 cubic feet. This wartime excess expenditure has not been written down, and the normal business, which, despite expansion of production, falls short of wartime necessities, is saddled with the burden of interest and depreciation charges on the emergency expenditure.

The yearly income at present oscillates in the vicinity of £35,000 per annum, but the value of the goods treated will give a better perspective of the magnitude of the business. Last year goods to the value of £2,142,966

were treated. Since the inception of the trade in refrigerated produce the value of the produce treated amounts to £54,500,000 sterling, of which the Victoria Dock Cool Stores' share has been £30,000,000. Such a volume of business, conducted in the interests of and to the unvarying satisfaction of primary producers over so long a period, speaks volumes for the assiduity and business capacity of Mr. R. Crowe, Exports Superintendent, who has controlled the undertaking throughout, while the creditable record of smooth working administration and continuous technical efficiency of the stores is a fine tribute to the skill and managerial attributes of Mr. J. Hepburn, the chief engineer and works manager, who has had consistently loyal support from his assistant officers, chamber hands, and casual workers in rendering this fine service to producers.

Early in the War the British War Office requested the Government to control by contracts, on its behalf, practically the whole of the primary exports from this State. For wool and wheat special organizations were set up, but for meat, rabbits, cheese, canned fruit, jams, and the like the Agricultural Department acted as agents for the War Office, and the Produce Division took control of the storage, shipping, insurance, and all other transactions connected with the contracts made, which reached a value of approximately £7,000,000 to Victorian primary producers. The whole of the business was handled without loss and to the entire satisfaction of the War Office and the Imperial Government auditors.

Storage and Transport Research.—Scientific research of a character fundamental to successful storage and transport of produce under low temperature was inaugurated some years ago, and eight specially designed experimental chambers with laboratory equipment are now in use. This work has been carried out successively by Mr. D. B. Adam, B.Sc.(Ag.), Mr. J. E. Harrison, B.Sc.(Ag.), and Mr. G. B. Tindale, B.Sc.(Ag.), who is still in charge. Messrs. Adam and Tindale have had the advantage of a visit abroad to acquire first hand knowledge of advances in low temperature research technique. Much progress has been made in the development of improved methods of cool storage, particularly in the case of fruit, and it is reasonably certain that the difficulties of extended storage or overseas shipment of varieties of fruit hitherto consumable only in the fresh state will be overcome. Important work on citrus storage and transport is at present on hand in collaboration with the Citrus Preservation Committee of the Commonwealth Council of Scientific and Industrial Research, Mr. Hepburn, Mr. Tindale, and Mr. F. M. Read, M.Sc.(Ag.), Horticultural Research Officer, being the departmental officers co-opted on the committee.

The Dairy Produce Act.

This Act is now incorporated as Part I. of the Consolidated Milk and Dairy Supervision Act, and is administered by a staff of nine Dairy Produce Inspectors, the Senior Inspector being Mr. Straughan. These officers exercise inspectional and educational duties in respect of the operations at all butter and dairy produce factories throughout the State, and their influence in maintaining and improving the quality of butter has been a distinct benefit to the industry. It is proposed to supplement their efforts by the appointment of a field dairy technologist and a dairy bacteriologist working at the laboratory of the University Veterinary Research Institute under Dr. H. E. Albiston.

A section of the Act which has had a most salutary effect upon the quality of cream for butter manufacture provides that the testing and grading of cream on reception at the factory shall be conducted by qualified and approved testers and graders. The reliable testing thus ensured is a guarantee that the farmer receives proper payment for his cream, and fearless grading for quality is necessary if high quality of the product is to be maintained. The Act assists materially in this regard by providing that a differential price must be paid for the defined grades of cream, and this provision has materially suppressed the practice of competing for cream supplies by paying high quality rates for lower quality deliveries.

Farm Produce Inspection.

The staff of this branch consists of the Senior Inspector, Mr. E. G. Hallebone, and nine inspectors, each of whom has passed a qualifying examination prior to appointment. Their duties are the inspection of and the issue of quality certificates for all classes of grain, flour, and farm produce, both for shipment overseas, interstate, and local trade. The inspecting officers undertake considerable responsibility in the issue of certificates on which business transactions of varying magnitude depend, and great

care requires to be exercised in conserving the interests of both buyer and seller.

The inspection of grain for export is not a statutory requirement, and very little of that going to the United Kingdom is shipped under Government supervision. The bulk of shipments to other parts of the world, however, are sold on contracts which stipulate certain standards of quality as certified to by Government officials. The overseas buyer is then assured of an independent assessment of quality on which he can rely, and the shipper is saved from the annoyance of disputations as to quality on outturn. Since the introduction of these certification facilities for trading, arbitrations and litigation which were not uncommon have diminished to vanishing point. In cases in which contracts so require, the Department also certifies to weight of each consignment, over the Government weighbridge, the weight of each truck delivered at the ship's side being carefully checked.

The following figures will illustrate the extent to which buyers overseas have availed themselves of the services offered by this branch of the Department during the year ending 30th June, 1929 (a normal year):—

Produce.	Quantity.	Destination.
Wheat ..	13,062,606 bus.	India, China, Japan
„ ..	519,066 „	South Africa
„ ..	294,978 „	Alexandria
„ ..	223,448 „	South America
Other grain, flour, agricultural seed, &c.	126,366 bags	Various

Representing a total value of £3,651,106.

The total wheat shipments from Victoria in 1928-29 amounted to 24,217,935 bushels, of which only 18 per cent. (4,608,100 bushels) went to the United Kingdom. The remainder, 82 per cent. (19,609,835 bushels), was shipped to Europe, Asia, Africa, South America, and New Zealand, and of this 73 per cent. was sold under contracts providing for Government inspection and certification.

For these services a charge of 3d. per ton is made for wheat, and for all other produce 6d. per ton, except where a tonnage rate is difficult to apply, when the charge is 3s. per hour for the officer's time. The revenue derived in this way during the year 1928-29 amounted to £6,043.

The statutory functions of the branch include the responsibility for the administration of the Farm Produce Agents Act, which provides for control over the methods of agents to whom farm produce is consigned for sale. Prosecutions, involving inspections and the taking of samples for analysis under the Stock Foods Act are undertaken by the Farm Produce Inspectors, as also are duties required under those parts of the Vegetation and Vine Diseases Act and the Commonwealth Commerce Act which apply to farm produce.

Potato and Onion Inspection.

The work of this branch is of great value to the potato and onion growing industry. It has enabled the substitution of orderly and economical marketing of potatoes and onions in place of the chaotic and disputatious system which previously prevailed. Inspections on which sales from growers to merchants are based are mostly made at country rail despatch stations, and a permit certificate to consign on the railways is issued in respect only of potatoes of merchantable grade and quality. Thus the grower is protected against loss resulting from consigning diseased or unmerchantable potatoes which would be condemned at the metropolitan destination, and merchants are assured that only potatoes of the certificated grade and quality will be consigned to them in fulfilment of a purchasing contract. Similarly interstate trade is facilitated by the purchasers in other States being protected by Government certificate as to the grade and quality of their purchases. The exporting merchant is likewise protected against unjustifiable rejection on delivery on a fallen market—a happening that was not infrequent in pre-inspection days. This system was inaugurated in 1911 to meet the conditions arising out of the severe outbreak of the disastrous Irish blight disease the previous year. The fees paid for inspection and certification have sufficed to cover the cost of the inspectional staff, which comprises a Senior Potato Inspector (Mr. N. Mackay) and seventeen Potato Inspectors, all of whom have passed a qualifying examination before appointment. Three are stationed at Ballarat, and one at each of the following districts:—Koroit, Colac, Warrnambool, Daylesford, Bunyip, Koo-weerup, and Trafalgar. Two are made available as required for duty at Leongatha, Bayles, Romsey, Drysdale, and Geelong districts, and the remaining five are stationed in Melbourne

The Better Farming Train.

for duty at the Cowper-street potato platform and the wharfs for the inspection of consignments from country railway stations where the volume of produce is not sufficient to warrant the stationing of an inspector. These metropolitan inspectors also do duty at city stores and weighbridges and at the Victoria and suburban markets.

Other activities of the Branch include the administration of those parts of the Vegetation and Vine Diseases Act, the Fruit and Vegetables Act, and the Health Acts, and regulations under these Acts, which relate to potatoes and onions. Inspection and certification under the Commonwealth Commerce Act for potatoes and onions exported overseas are also undertaken.

Poultry Branch.

The keeping of fowls as a domestic auxiliary is so familiar a proceeding that poultry keeping is not generally regarded as a definite primary industry, and it will probably be a surprise to many to learn that poultry raising ranks next to wool, wheat, dairying, and meat among the established primary industries, and accounts for approximately five millions sterling of the national wealth materialized annually in Victoria.

The Department fosters the development of high-class poultry culture in many ways. It has a staff of poultry specialists comprising Mr. W. C. Rugg, Chief Poultry Expert, and Messrs. H. F. Clinton, W. O. Pederick, and R. Hart, whose duties involve mainly educational and advisory guidance to poultry farmers, settlers, and others on the housing, feeding, and breeding of poultry, egg production, and marketing and like matters of economic importance. Lectures and demonstrations on the selection of breeding stock culling, and the dressing of table poultry are popular items at agricultural shows and poultry society meetings. Mr. Rugg has supervisory control of the widely appreciated Burnley egg-laying competition, the officer in charge being Mr. J. T. Macauley.

An export trade in eggs is steadily developing. Last season 55,000 cases of 30 dozen each, having a total value of £100,000, were shipped to the United Kingdom.

Sheep and Wool.

Reference to the sheep and wool industry should have been made when the Live Stock Division was under review, as the Sheep and Wool Expert, Mr. N. A. Bowman, is attached to that division.

Mr. Bowman's appointment in 1925 was prompted by the realization that guidance in sheep husbandry was necessary to promote the most advantageous practices in lamb breeding and fattening, and in the classing and market-

Sheep-breeding Lecture—Better Farming Train.

ing preparation of the farmers' wool clip. Mr. Bowman's services are extensively availed of on such maters as selection of breeding stock, mating, lambing, marking, culling, shearing procedure, wool classing, and hygienic management, and his vigorous activities in these directions are widely appreciated.

Agricultural Education.

The Department of Agriculture is keenly interested in agricultural education, and co-operates actively with the Melbourne University School of Agriculture, and through the Council of Agricultural Education with the Dookie and Longerenong Agricultural Colleges in the respective courses undertaken by these organizations.

In 1919 the Agricultural Science course at the University was amended and extended. Joint representations by the University and the Department resulted in the Government passing the University Agricultural Education Act, by which funds were provided for building the School of Agriculture and providing an annual grant to meet the expenditure on the amplified four years' course of instruction for the Degree of Bachelor of Agricultural Science. Seven officers of the Department act as lecturers for subjects throughout the course. Provision is also made in the Act for the granting of a certain number of "free places" for the degree course on nomination by the Minister for Agriculture and for the employment by the Department of a certain number of graduates annually. At present 34 officers of the Department are graduates in Agricultural Science of the Melbourne University.

By means of farmers' classes held periodically through the year, lectures to agricultural societies and the like organizations at country centres, and farmers' field days at the experiment farms and colleges, the Department undertakes the major portion of the instruction that is available to those actively engaged in farming.

BETTER FARMING TRAIN.

This review would be decidedly incomplete without reference being made to the Department's most effective propaganda effort, viz., the Better Farming Train, and as all divisions participate in the effort, mention of it has been left to the last.

The Better Farming Train has been described as an "Agricultural College on Wheels," but this description is scarcely apt. No agricultural college could make such a wide appeal in so short a time as does the Better Farming Train on its triumphal country tours. At least 5,000 people attend the 100 or more lectures and demonstrations given during a ten days' trip. None of the efforts of Government Departments or other organizations to effect advancements in agricultural methods have achieved such results in education and the practical application of scientific knowledge in farming as has the Better Farming Train. Visitors, including many from abroad, who have spent a day in observing the train and its staff in action, have been struck with wonderment at the throbbing interest that is shown and the keenness displayed by the practical farmers, their women folk, and the budding generation of agriculturists that constitute the day-long audiences. In the lecture tent, at the stock parades, and in the various compartments of the train, hundreds of convincing exhibits are brought under the eye and into the minds of eager farmers, while their

The Better Farming Train—Sister Peck Lecturing on Baby Welfare.

meaning and the lessons they teach are expounded by the tireless band of enthusiastic specialists that man the train.

The train in being is a manifestation of the success that may be achieved by the generous and genuine co-operation of Government Departments. In this case the Railways Department and the Agricultural Department have been mainly concerned, but valuable assistance has also been rendered by the Education Department, the Health Department, and the State Rivers and Water Supply Commission. Outstanding in inspiration and support has been Mr. Harold Clapp, Chief Commissioner of the Victorian Railways, whose unique capacity for exploiting publicity methods to the full in the interests of agriculture has been a major factor in the achievement. Along with the "drive" imparted by Mr. Clapp and his staff, the Department of Agriculture fortunately was ready with the facts and lessons resulting from researches, experiments, and practical trials of improved methods which could be exemplified by easily comprehended exhibits and convincingly demonstrated by the exponent officers.

The train has been the means of spreading and conveying sound knowledge to thousands of agriculturists in every part of the State, and has promoted the spread of herd-testing and the use of production-bred bulls, top-dressing, rotational grazing and improved pasture management, intensive cultivation methods and economic fertilization in wheat farming, improvement in orchard management and in the packing and marketing of fruit, baby welfare methods, domestic science teachings, home cookery and needlework.

Some tribute must be paid to officers who have staffed the train on its various tours. Throughout the 32 trips that have been made, Mr. C. Mullany, Railways Organizing Officer, has undertaken the organization work preceding each tour, and has had charge of the train running arrangements on tour. His managerial capacity and unfailing urbanity have been largely responsible for the fine co-operative staff work throughout. Mr. R. J. de Courcey Talbot, B.V.Sc., of the Department of Agriculture, has been officer-in-charge of the train on all but a few of the early tours, and his direction of the duties of the technical staff has manifested administrative capacity of high order, and a popularity with staff and farmers alike of which he should be proud. As team work has been an outstanding characteristic on all the tours, every officer who has participated in the tours may regard himself as worthy of praise, but special mention is due to Sister Peck of the Health Department, whose baby

Live-stock Parade—Better Farming Train.

welfare work was probably the most popular feature throughout the tours; to the ladies of the Education Department who undertook cookery and needlework respectively; to Mr. W. Shew, B.V.Sc., in the veterinary and horse car; to Mr. J. Brake, B.Sc. (Ag.), and Mr. A. Hackwell, B.Sc.(Ag.), in the agricultural section; to Messrs. Gill and Yuill, undertaking jointly dairying, herd-testing, and pig-farming; to Mr. N. A. Bowman, in charge of the sheep car; to Mr. W. C. Rugg, on poultry exhibits; and to Mr. J. Kelly, the stockman, whose assiduous care of the live stock exhibits was responsible for the singular absence of casualties.

Thanks are due also to the numerous stud stock breeders who loaned their valuable stud animals for demonstration purposes on the tours.

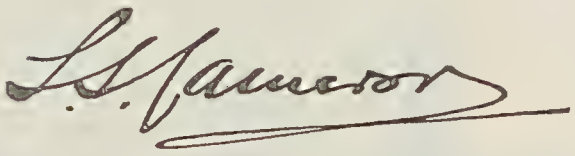
Conclusion.

This review of the Department was undertaken on the suggestion of the Assistant Minister for Agriculture, the Hon. R. T. Pollard, M.L.A., who intimated that during his occupancy of the Ministerial chair he had felt that not sufficient was known by the community which the Department exists to serve concerning the plan of staff organization, the character and wide range of duties, or of the qualifications and specific functions of the personnel. It has therefore been by design that so much mention has been made of individual officers.

I wish to disclaim, however, any desire to convey the impression that the very excellent progress in departmental service to agriculture that has been made during the last twenty years is a matter for staff commendation solely. During that period the Department has received encouragement from many quarters. Successive Parliaments and Governments have been appreciative of the requirements and advice of the Department. Each of the somewhat long list of Ministers and Assistant Ministers (the Honorables G. Graham, W. Hutchinson, F. W. Hagelthorn, D. S. Oman, T. Livingston, H. S. W. Lawson, J. W. Pennington, F. E. Old, M. E. Wettenhall, J. Gordon, E. J. Hogan, M. W. J. Bourchier, W. Slater, J. Cain, J. W. Pennington, W. Slater, and R. T. Pollard) has been solicitous for the welfare of the "man on the land," and has given sympathetic encouragement and support to the efforts of the staff.

The Department has been fortunate, too, in gaining the goodwill and assistance of the farming community and country people generally. A satisfactory relationship has existed throughout with other Government Departments, and much appreciated assistance has been received, particularly from the Railways Department, the State Rivers and Water Supply Commission, the Education Department, and the Law Department. Most helpful of all, perhaps, has been the encouragement, support, and assistance received from outside organizations, notably the Chamber of Agriculture, the Royal Agricultural Society, the leading wool houses, stock and station agents, fertilizer, machinery and stock food firms, the Mill Owners' Association, Stud and Herd Societies, the United Cow Testing Association, district agricultural societies and progress associations, the Melbourne University, and the Commonwealth Council of Scientific and Industrial Research. Finally, the cordial relationship which has been maintained with the Departments of Agriculture in all the other States has been of very definite value and appreciated accordingly.

With a personal expression of goodwill towards every man who has served the Department during my régime I will bring this review to a close on the note struck in one of the early paragraphs to the effect that I feel justification for "the hope that a departmental tradition has been founded that will continue to inspire and maintain a staff co-operant in effort to serve."



D.V.Sc., M.R.C.V.S.,
Director of Agriculture, 1911-1931.

Pasture Management

Principles of Controlled Grazing

[*An address delivered at the annual Convention of the Chamber of Agriculture by H. A. MULLETT, B.Agr.Sc., Agricultural Superintendent.*]

THE drastic fall in the prices of staple agricultural commodities has forced primary producers to overhaul production costs, not so much in the hope that the various industries can be made profitable at present prices, but in order to reduce losses to the minimum. In each of the primary industries a substantial reduction of production costs is possible, and one of the principal ways in which this may be effected is by scientifically increased acreage yields. Usually such methods are regarded as productive of relatively slow improvement, but where they are simple and practical in character, and do not involve drastic re-organization of methods, there is no reason why rapid results should not be obtained. In such cases the limiting factor is the speed with which the knowledge can be disseminated and the degree of belief in its effectiveness that can be engendered in the minds of the producers.

I believe there is no single method by which the producers of this State can reduce the cost of production in dairying, sheep raising, and beef production so effectively as by better pasture management. We have a wonderful natural heritage in the 18,000,000 acres of pasture land in this State which reside within the 20-in. line of annual rainfall. On this the greater portion of our flocks and herds are depastured.

After many years of almost sole dependence on Nature's chance bounty, we have at last begun to realize that grass is as responsive as any other crop to scientific management. If we can but convert that realization into action, I believe that the production over the greater part of that huge territory can be lifted rapidly by at least 100 per cent. Such expansion, of course, is not to be obtained without expenditure of time, effort, and capital, but, wisely directed, it cannot but substantially reduce costs in these industries. With the present outlook for price levels this is obviously the avenue to which attention should be given rather than to the opening up of new lands.

A careful survey of the methods by which the carrying capacity of pastures may be increased shows three principal ones:—

(1) New pasture grasses and better strains of existing grasses;
(2) Scientific methods of feeding pasture to stock; and
(3) Judicious top-dressing.

Much could be said of the first method, and I could dilate upon the important field that is being opened up by the Department's work with the selection of improved strains of subterranean clover, Wimmera rye grass, English rye grass, cocksfoot, white Dutch clover, &c., but to attempt to apply this method of improvement to get quick results over 18,000,000 acres is a stupendous task. Accordingly, desirable as it is as a long-range policy of develop-

Wimmera Rye Grass Strains, State Farm, Rutherglen.

ment, and with a full knowledge that the maximum productivity will never be obtained until the pastures contain the most productive species, I pass it by to-day to spend the time in examining the two latter methods, which are much more easy of application and are capable of giving immediate results.

Scientific Methods of Feeding Pasture to Stock.

Briefly the most scientific method of grazing consists in systematically feeding off the pastures at the stage of maximum food value—thus eliminating heavy losses of food material due to chemical changes which take place with advancing age—in the prevention of rank patches, and in the systematic distribution of the dung.

To better explain the method, I would ask you to travel with me in imagination to Gippsland in the late spring and inspect a typical dairy pasture. Characteristically you find it to consist of a series of patches cropped almost as closely as a lawn interspersed with tall rank growth. The fact is that the cattle are being almost entirely supported by these short patches which occupy about one-third of the pasture, and they visit and revisit them from time to time. The rest of the grass is either not eaten at all or left until the following autumn and winter, when it is very indigestible and its food content very low.

The following figures giving the analyses (dry basis) of pasture in varying stages show comparisons with meadow hay and bran, and make clear the reason why the animals concentrate upon the short pasture and neglect the rank patches.

	Very Young Pasture.	Pasture Usual Stage of Feeding.	Meadow Hay.	Bran.
	%	%	%	%
Ash	12·1	9·4	8·3	4·5
Protein ..	27·0	16·2	7·2	16·0
Fat	5·7	3·8	2·1	4·0
Fibre	17·3	27·1	30·9	8·0
Carbohydrates ..	37·9	43·5	51·4	67·5
Digestible Nutrients.				
Protein ..	22·0	9·7	3·6	12·8
Fat	3·6	1·7	1·1	2·2
Fibre	14·7	14·8	12·1	3·2
Carbohydrates ..	32·5	27·3	30·0	40·5

The richness in total nutrients and the high digestibility of very young pasture relative to pasture at the average feeding stage, and particularly to meadow hay, is apparent from a comparison of the above tables. The production starch equivalent per 100 lb. dry weight in very young pasture is 71.3 lb., average pasture 50 lb., meadow hay 35 lb., and bran 47 lb.

Very young grass has a nutritive ratio of 1 to 2.5 as compared with 1 to 5.7 for average pasture, 1 to 12.3 for meadow hay, and 1 to 4.0 for bran. It will thus be seen that according to the stage of growth grass can behave either as a concentrate rich in protein, as a foodstuff of average nutritive value, e.g., pasture hay, or, if allowed to mature and eaten dry in the autumn, as coarse roughage. It is also a fact that the younger pasture is the richer it is in fat, phosphates, and lime. Again, the percentage of crude fibre in its most digestible form is greatest in young grass and decreases as the grass gets older.

Of course it is unnecessary and undesirable to feed stock wholly on grass so young that it behaves as a concentrate; such a practice would be wasteful and may well be harmful to the health of the animals. But it is desirable that the average pastures should be fed a great deal younger than they are, and that any surplus should be removed and stored for use at leaner times of the year.

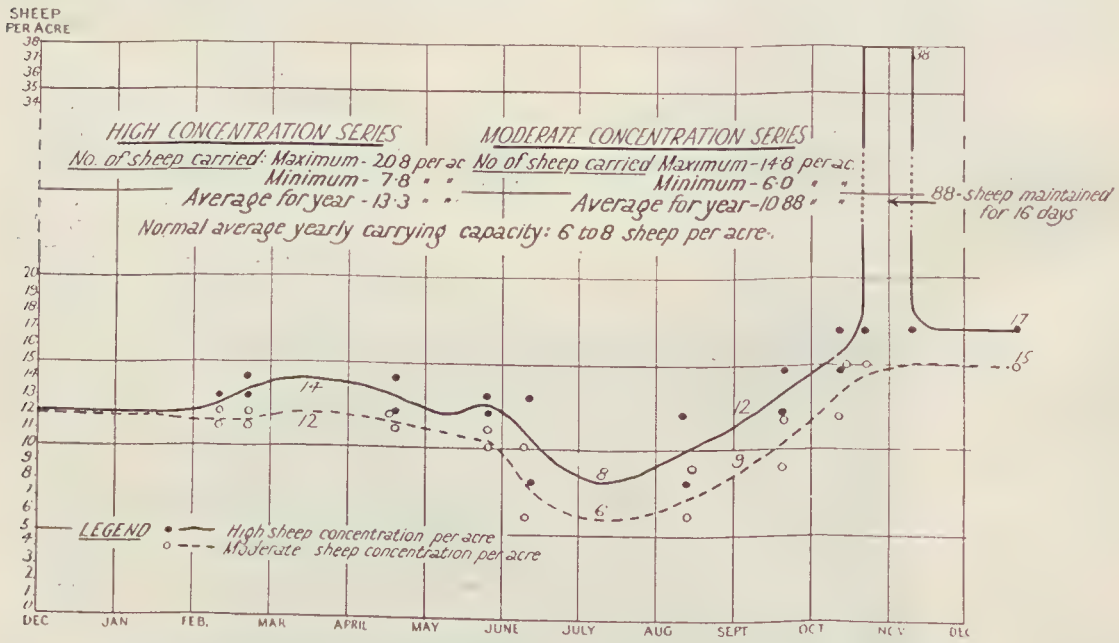
Once the significance of feeding pastures younger and more uniformly is recognized the problem becomes one of devising methods by which this can be done in practice. Under the stress of the war Germany was forced to increase the carrying capacity of her pasture, and evolved a system at Hohenheim under which dairy cattle are concentrated at ten to fifteen times the normal rate upon the pastures for periods correspondingly shortened for each paddock. By providing from ten to twelve paddocks it was found practicable to change the cattle to a fresh paddock every two days, completing the circuit in 20 to 24 days. By this means the carrying capacity was materially increased. Subsequently this system, known as rotational grazing, extended into England, New Zealand, and elsewhere. In its most intensive form the rotation is very rigidly adhered to, and dry cattle as followers are provided to clean up any rough herbage left, or if not the rough grass may be levelled by a mower. Heavy and repeated manuring with phosphates and

nitrogenous manures may be undertaken, and the pasture may be harrowed to spread dung, and even severely harrowed to several inches deep to reinvigorate the pasture. In the flush of the year naturally the grass grows faster than usual, and then one or more fields may be closed against the stock and the produce cut and cured as grass hay or ensilage and used to supplement the feed during the slow growth period in the winter.

Naturally this system in such an intensive form involves considerable re-organization of farm routine, and the provision of extra fences and watering places, but, in view of the greatly increased carrying capacity claimed for it, it is worth pausing to examine the prospects of its successful adoption in this State, or, if incapable of use in its entirety, to see whether any modification is practicable.

A test of the system was made last year on irrigated pasture at the Research Farm, Werribee, where a field of 10 acres, normally carrying six to eight sheep per acre average for the year round was subdivided into two series of paddocks, i.e., two 2½-acre paddocks and ten ½-acre paddocks. In the first series, known as the moderate concentration series, two-tooth wethers at the rate of 24 per acre were placed on each 2½-acre field for ten-day intervals alternately. In the other or high concentration series sheep at the rate of 168 per acre were placed for two-day intervals on each ½-acre field in succession. The pasture was given a manurial dressing of superphosphate at the rate of 2 cwt. per acre, but no nitrogen. The sheep were weighed every ten days throughout the year, and were eventually sold as fats, topping the market at the Newmarket yards.

The results can be readily seen by referring to the accompanying graph. The high concentration series carried on the average about 2½ sheep to the acre more than the low concentration series, and the latter roughly a similar number more than the normal grazing capacity of the paddock. The high concentration series averaged 13.3 sheep per acre, with a maximum of 20.8 and a minimum of 7.8, while the moderate concentration series averaged 10.88 sheep with a maximum of 14.8 and a minimum of 6.0. During the period of maximum growth in the spring the grass on the high concentration series grew faster than the sheep could eat it, and consequently for a period of about two months it was not kept as short as was aimed at originally—2½ to 3 inches. Hence there was probably some loss of carrying capacity owing to decline in digestibility, &c.,

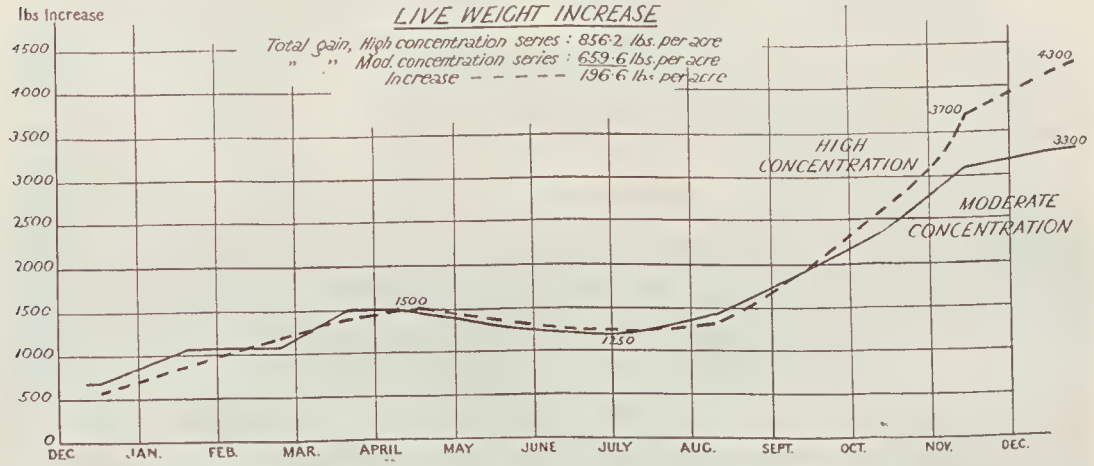


Graph showing numbers of sheep carried per acre in the Rotational Grazing Tests, State Research Farm, Werribee.

due to increasing age of the grass. Eventually a mob of 88 sheep, in addition to the normal numbers, were maintained on it for sixteen days.

These figures of themselves are not very significant unless supported by data defining the condition of the sheep. The weekly weighings show that the high concentration series gained 4,281 lb. on the 5 acres in the twelve months, and the low concentration series 3,298 lb., i.e., 983 lb. greater live weight increase for the sheep on the 5 acres grazed under high concentration than for the moderate concentration.

In Europe and New Zealand the growing period is notable for regularity of the rains and the uniformity of their distribution, and naturally this is a factor which is likely to favour the adoption of such a nicely-balanced practice. The greater the risk of sudden rainfall deficiency or abundance, the more difficult the carrying out of the routine to an orderly plan. Obviously the districts where the growth of grass is best controlled by the will of man are those under irrigation. Already a number of settlers in the irrigation districts have



Graph showing Increases in Live Weight of Sheep on the Rotational Grazing Tests, Werribee.

Naturally under such concentrations of sheep per acre the degree to which the pastures were fouled with urine and dung was likely to be of considerable importance. Examination of the fouled paddocks once or twice was especially favoured when urine damaged grass was for some reason rendered visible. On these occasions it was to be seen that probably 50 per cent. of the pasture had been urinated upon, thus obviously the concentration was approaching the maximum practicable.

I need hardly say that these experiments are not concluded, and it is not my purpose to report them in detail as experiments, but I wish merely to illustrate to you by an actual example what can be achieved along these lines. Further tests have been conducted at Darnum on the Gainsborough Flats with dairy cattle. These also indicate the advantage from a stock-carrying point of view of the policy of concentrating the stock upon the paddocks in rotation, spelling them meanwhile.

adopted the system or some modification of it with beneficial results. Indeed, one settler, Mr. Hanslow of Tongala, initiated a rotational grazing system himself many years ago, but in this case with lucerne, which was fed, not when young, but when just in flower. The holdings are small, water abundant, and hence intensification not difficult or costly. This then is an area *par excellence* for rotational grazing. Elsewhere the intensive form will be required to be adopted with caution, and its economics carefully examined. Working to a prearranged plan a paddock or two can be subdivided and subjected to controlled grazing and the results carefully noted—if satisfactory the system can be extended, but it should be adopted gradually, a paddock or two at a time. The greatest commercial success is likely where the pastures already are well developed and highly productive, and where the climatic con-

ditions approximate most to those of the countries where success already has been attained.

Over the greater bulk of our pasture lands in the moister parts of the State, the conditions—stage of pasture development and general economics—are scarcely suitable for the intensified system, but there is no reason why the principles should not be clearly recognized and put into practice as far as the individual local conditions permit. *It will pay almost every one to embark courageously upon a programme of subdivision with a view to adopting the policy of alternately concentrating stock on and resting the paddocks, not upon such a rigid rotation plan as that outlined, but at least on a systematic grazing plan in which due regard is paid to the modern principles of pasture management and the modifications required to meet local conditions.* All experienced stockmen agree that a change of feed is beneficial to stock, but many do not really realize the reward arising from the systematic provision of the short bite.

In the case of dairy cattle, perhaps another direction from which great improvement could come is systematic harrowing of the dung. Seventy-five per cent. of the original food value of the grass is returned as dung, but if left unspread the pat enriches the land in the immediate vicinity to such an extent that the grass is rank and wasted. How much more beneficial it is to spread that fertility more uniformly over the field so that the grass is evenly benefited and no fertility wasted.

Naturally such a method of increasing carrying capacity must go hand in hand with scientific top-dressing.

[*The balance of this address relating to top-dressing of pastures will be published in the April issue.*]

General View, Rotational Grazing Tests, Werribee.

Advertising Victorian Produce

Gift Scheme Popular

Victorian Produce Available for Overseas Gifts.

THREE years ago the Department of Agriculture inaugurated a scheme under which arrangements were made to facilitate the forwarding overseas of presents of Victorian produce. It was thought that many Australians with friends and relatives in Great Britain and on the continent would be glad to take advantage of the opportunity to forward at Christmas, Easter, or other period of the year, a present that would be of use to the recipient and, at the same time, a valuable advertisement for the produce of Victoria's fertile soils.

The suggestion that such a scheme might be of considerable value in making our produce more widely known on the other side of the world, and thus creating a greater demand for the exportable surplus, was put forward first towards the end of 1927. Arrangements were made immediately to accept orders for presents for delivery in Great Britain by Christmas, and, although time was short and little

publicity was possible, numerous orders were received and, a day or two before Christmas, 232 cases of produce were delivered to many parts of England, Scotland, Wales, Ireland, and on the continent. So successful was this first attempt that it was decided to make the scheme a permanent one. In the following year orders for Christmas presents amounted to 1,045 cases, and in 1929 the number increased to 1,150 cases.

Since then the scheme has been enlarged to permit of presents being sent at any time of the year, and many persons here have taken advantage of the opportunity to forward Easter and birthday gifts. That the scheme is gaining steadily in popularity is evidenced by the substantial increase in the number of orders received, the figures for 1930 being 1,219 orders for 1,447 cases of produce, or 296 cases more than were sent in the preceding year. Receipts for the year totalled £1,752, and since the scheme has been in operation total receipts have amounted to £5,121. In that period 3,365 orders have been received, and 3,873 cases of Victorian produce have been delivered to the recipients overseas. These were made up of 1,713 cases of canned fruit, 1,011 cases of dried fruit, 396 cases of wine, 225 cases of jam, 197 carcasses of lamb, 191 boxes of butter, and 136 cases of apples. Butter, apples, and pears have been included only recently, and apples and pears are available only during the export season.

Fac-simile of Card enclosed with each Present.

What the Scheme Offers.

Briefly the scheme offers to those who desire to send presents to friends in Britain and on the continent at Christmas, Easter, on birthdays, or at any time throughout the year, the opportunity of sending without trouble, and at a minimum of expense, choice quality samples of Victorian produce

30 lbs. of Dried Fruit—Sultanas, Currants and Raisins—delivered in Great Britain for £1.

24 Tins of Canned Fruits—Peaches, Pears and Apricots—delivered for £1 5s.

10 lbs. Choicest Victorian Butter for 17s. 6d.

such as fruit, wine, lamb, jam, or butter. The gifts available and prices charged are as follow:—

	s.	d.
10. lb. of choice butter	17	6
30 lb. of assorted dried vine fruits	20	0
24 tins of assorted canned fruit ..	25	0
1 carcass of prime lamb	30	0
24 tins of assorted jam	32	6
24 pint bottles assorted wine ..	40	0
1 case of fresh apples (from February to May only)	17	6
1 case of fresh pears (export season only)	20	0

Orders to forward any of these to any address should be accompanied by remittances and addressed to the Director of Agriculture, Treasury Gardens, Melbourne, C.2. Orders for gifts to residents of the Irish Free State or European countries must, in addition, be accompanied by an amount to meet any customs duties payable. Arrangements are made by the Department for delivery to the address given without any further expense than the amounts stated above, which cover cost of purchase of the goods, freight, and delivery charges.

The organization of the scheme at the London end is in the hands of Mr. F. White, Trade Commissioner attached to the office of the Agent-General for Victoria. On receipt of the list of orders from Victoria Mr. White writes a personal letter to each of the recipients of the presents informing them of the nature of the present and the name of the donor, and asking if the date intended for delivery is suitable. This precaution is necessary, particularly when the present is of perishable produce, and it is desired also to confirm the address and ensure safe delivery.

That the scheme has been very much appreciated by the recipients of the presents is evidenced by the many eulogistic letters that have been received by the Department. A few extracts from some of these letters may be quoted. Here is one from Staffordshire:—"I have never seen nicer fruit and heartily congratulate Victoria on her fine produce, which is second to none." Another from Ilford, Essex:—"I consider the fruit of the finest quality I have seen in England." One from Glasgow writes:—"It is delightful wine, and

A Choice Present for an Overseas Family—A carcass of Prime Victorian Lamb delivered in Great Britain for £1 10s.

24 Pint Bottles of Assorted Wines can be sent for £2.

should take a big place among the world's wines." One from Gloucestershire says:—"The tinned fruit is the best we have ever tasted." Another from Surrey:—"The fruit was excellent; I have never seen better from any source." A man in Wales, after receiving a carcass of lamb, wrote:—"I have seldom seen or partaken of equal quality, and am inquiring for further supplies." Yet another received within the last few days:—"Everything was as nearly perfect as Nature, and it is difficult to credit the care, &c., bestowed on these items to enable us to enjoy them. The butter especially after the long journey was extra good."

Many more extracts written in a similar strain could be quoted were it not for the limitations of space, but it should be added that in a great many instances the writers state that they will use no other produce while they can obtain those from Australia.

An appeal to buy more Australian goods is included in each package, and thus this exhortation is brought directly under the notice of the recipients, who have before them in the gift tangible evidence of the quality of the produce Australia has to sell. That this form of publicity is of considerable value is shown by the fact that for every package sent out last year three inquiries were received by the Agent-General.

Apart from orders sent to the United Kingdom, there have been several gifts forwarded to France, Switzerland, Germany, and Denmark, and last year special arrangements were made for delivery of a case of canned fruit to Montreal, Canada, and of a case of a grower's own dried fruit to the Channel Islands.

In each case sent out the Agent-General enclosed a booklet issued by the Victorian Railways Department and entitled "Picturesque Victoria," and copies of the dried fruit recipe booklet issued by the Victorian Dried Fruits Board were enclosed with the dried fruits gifts. A special booklet describing the industries associated with the exportable produce embodied in the scheme has been prepared and will be enclosed with all future gifts.

During the Apple Export Season a Case of Apples may be forwarded for 17s. 6d.

Packing Fruit for Export

Standard Apple and Pear Cases

By Basil Krone, Fruit Packing Instructor.

AUSTRALIAN exporters of apples and pears have to face very keen competition from other parts of the world, and if they are to obtain their fair share of the overseas trade it is essential that every opportunity should be taken to improve the grading, packing, and presentation of these fruits. Good fruit, well graded and packed, brings the best returns, and it should be the object of every grower to select and pack his fruit in such a way that it will reach the overseas market in the best possible condition.

Shipping Portion of Consignment of 11,000 Cases of Pears for London.

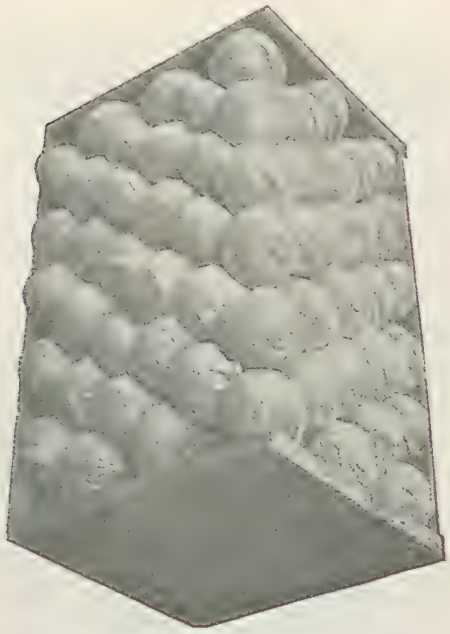
The rapid change over from the old style "dump" case to the more modern standard case has made the former style of package obsolete, at least as far as the export trade is concerned. In Victoria the export of fruit in the standard case is still in its infancy, and for that reason it is proposed to offer some suggestions which may save worry and expense to the producer.

The Standard Apple Case.

The internal measurements of the standard apple case are 18 inches long, 11½ inches wide, and 10½ inches deep. When making the case from shooks some growers, unfortunately, have made them up with the side nailed on where the lid ought to be. When this mistake has been made it is practically impossible to get the correct count of fruit into the case, also the packer cannot obtain an efficient bulge, which is so desirable to protect the fruit from bruising during transit. Some faulty packs have been traced directly to this mistake. Remember, it is the shallow measurement (10½ inches) that is the depth.

If the lid be in two pieces, these should be kept as close together as possible when being nailed on the case. If a wide gap is left between the boards, the apples may become damaged at this part. What has been said about the lid applies equally to the bottom boards when the case is being made up.

There is nothing more detrimental to the carriage of fruit than cases with badly cut timber. The value of the case lies not only in its attractiveness, but also in the manner in which the timber has been cut. For instance, the side boards should be much thicker than the lid or bottom. The former should be strong and thick enough to resist any bulging or reasonable pressure, while the lid and bottom, on the other hand, should be



Apples Packed for Export in the Standard Case.

so thin and flexible that they will bend comfortably over the fruit after the usual bulge in the packing has been formed.

It might be well to add that a standard case is not complete unless cleats are used at each end of the lid and bottom. These not only hold the lid and bottom securely, but help to protect the bulge. Simple defects are being stressed purposely because occasionally they are the cause of fruit deteriorating during transit.

The Standard Pear Case.

The inside measurements of this package are 18 inches by 11½ inches by 8 inches, the shallow measurement being the depth. In every respect the standard pear case (or the "Three-quarter Canadian Bushel," as it is sometimes referred to) should be made up from the shooks in similar manner to the standard apple case.

Pears for export should be wrapped in 10-in. x 10-in. sulphite wrappers (9-in. x 9-in. is too small) and packed on the 3-3 diagonal system. There should be three, four, or five layers of pears in each case, according to the size.

When the case is packed, the top layer of fruit should "bulge" an inch and a half to an inch and three-quarters, or even more if the pears have been loosely placed in the layers before the lid is nailed on. This applies also to apples in the standard apple case.

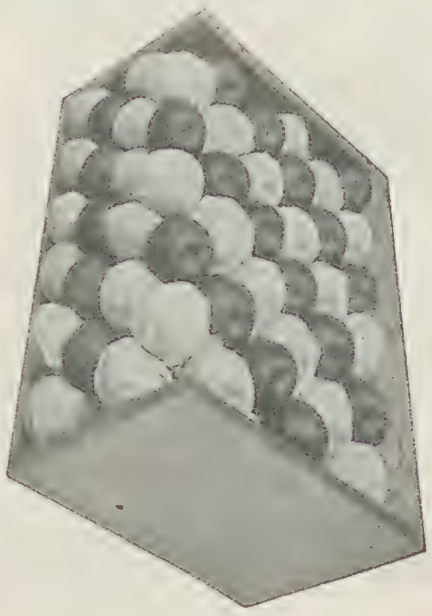
Lining paper is not necessary, but a thin layer of well teased out wood-wool should be used at the top and bottom and a corrugated cardboard (with the corrugations away from the fruit) at each side of the case.

Packing in Pear Trays.

Packing pears in trays denotes a very high class trade, but as the cost of these is greater than for cases, consideration to the size and variety of the fruit should first be given to ascertain if the extra expense is warranted.

It is suggested that trays be used only for high class, melting varieties of pears, such as William's Bon Chretien or Doyenne du Comice, and that the fruit be practically the one size and count throughout the consignment, namely 2¾ inches. To do this, trays should be used in conjunction with the cases for the two varieties mentioned, all sizes from 2¼ inches and up to, but not including, 2¾ inches being packed in cases and the 2¾ inches only in the trays.

The inside measurement of the trays should be 18 x 11½ x 3 inches. The pears should be wrapped and packed on the diagonal system with a layer of wood-wool at the top and



Apples Packed for Export in the Dump Case.

bottom. Each tray should be lidded separately with a cleat at each end above the lid, and not fastened together in sets of three as has been usual for the old-fashioned "dump" trays.

The total number of pears should be stamped on one end of each tray instead of the size. This applies also to the standard pear case and the standard apple case.

Labelling.

Labels occasionally come off cases at the wharfs, and to prevent this it is suggested that all cases should be labelled at least one day ahead of packing so that the labels may dry thoroughly before the case is used. Where this is not done the moisture from pre-cooling or from the iced trucks is liable to loosen the label so that it may be easily torn off.

Williams Bon Chretien Pears Packed for Export.

Should the label blister before packing, try the following:—First, soak a bundle of labels in a bucket of water for a quarter of an hour or so, then lift out to drain. Second, apply the paste to the bare ends of a dozen or twenty cases. This will fill the pores of the wood. Then simply apply the damp label without paste on it, and rub out the air bubbles with a clean stiff brush or cloth. This is by far the quickest and best method to adopt when a moderately thick paste is used. It also prevents the curling of the label during the operation.

On the other hand, with a label from which the dye will run if wet, the paste should be applied to the bare ends of the cases in the usual manner. Then, instead of the labels being soaked paste is applied to the back of each before sticking, and they are rubbed out in the usual way. It is important that the paste for this method should be thinner than when wet labels are used.

Much confusion is caused by labelling or stencilling cases, and particularly trays, on the lids and sides. Apart from being a breach of the Regulations, such labelling makes it utterly impossible to identify the packages when they are in the body of a large consignment. The end of the case or tray is the correct place to label.

The essential identification marks to be branded on a case for export are as follow:—

1. The agent's or shipper's number.
2. The grade ("Special," "Standard," or "Plain").
3. The name of the variety of the fruit.
4. The grower's name and address, or his registered brand showing the country and district of origin.
5. The exact count (or number of fruits) instead of the size. This is very important.

The size of the wording should be half an inch if printed on a label, and at least three-quarters of an inch if stencilled on the case.

In the past the packer of apples or pears for export has been accustomed to packing strictly to a number of sizes, such as $2\frac{1}{4}$, $2\frac{1}{2}$ inches, &c., and, as far as the Australian "dump" case is concerned, sizes or counts may be used for interstate trade. But the standard fruit case for export has a very thin flexible lid and bottom, which expand according to the height the fruit has been packed, and this, together with the fact that fruit is now sold largely by the dozen, is responsible for the "count" or total number in the case having been standardized instead of the diameter of the fruit.

Grading and Packing.

Packing fruit to the correct height in the case and the snugness of the specimens in each layer are the important safeguards against bruising during transit over long distances.

No matter how neatly and snugly each layer may be packed, if the fruit is not sufficiently high in the case for the lid to hold the complete contents securely, the packing is a failure. The height the fruit comes above the top of the case is known as the bulge. This allows for natural shrinkage to take place and prevents the fruit from becoming loose and bruised in transit.

The height of the bulge for both the apple and pear case should be from one and a half

to two inches at the centre, and from a half to three-quarters of an inch at each end before the lid is nailed on. It is not necessary to pack larger fruit in the centres of each layer to form the bulge, as this means unevenly sized fruit. The bulge can be attained with fruit of uniform size. It will be noticed that the pockets at both ends of each layer are slightly larger than those in the rest of the pack. These will automatically permit a natural bulge when the case is finished. The amount of bulge, or height, is controlled by the size of the pockets or spaces between the fruit, which can be made larger or smaller by packing the layers more tightly or more loosely than usual. A study of these conditions will enable the packer to determine if his pack is sufficiently high enough in the case. Good packing depends upon accurate sizing.

Harvesting.

The first step in successful marketing is careful harvesting, plus a knowledge of maturity stages.

The best packing in the world is useless unless the fruit has been harvested at that stage of maturity which will ensure the proper completion of the ripening process. Therefore, as some growers are often misled by depending upon the colour of the pips, I offer the following five salient points as a practical guide to the correct time for harvesting the pear:—

1. The changing of the ground colour of the portion of the skin between the dots or lenticels from a dark green to a very pale green.
2. The changing from a light to a dark colour of the dots or lenticels themselves which appear upon the skin of a pear. These also become more shallow in appearance during first signs of maturity.
3. Juice immediately rushes to the surface if a slice is cut from the pear. It remains dry if the fruit is immature.
4. The well filled out appearance of the pear.
5. The ease with which the fruit can be separated from the spurs when harvesting.

This combination of points is a very reliable indication and maturity guide.

The following packing chart has been specially designed for William's Bon Chretien pears in the 8-in. standard pear case (18 inches long, 11½ inches wide, 8 inches deep—inside measurements):—

Size.	Pack.	Layer.	Layers.	Total.	Remarks.
2¼"	3-3	5 x 5	5	150	Pack more *loosely* than usual
	3-3	6 x 5	4	132*	Normal pack
2½"	3-3	5 x 5	4	120*	Normal pack
	3-3	5 x 4	4	108*	Normal pack
	3-3	4 x 4	4	96*	Normal pack
2¾"	3-3	4 x 3	4	84*	Pack more *loosely* than usual
3"	3-2	5 x 4	3	68	Pack more *tightly* than usual
3¼"	3-2	4 x 4	3	60	Normal pack

NOTE.—The counts marked (*) are the most suitable for export. The count, and not the diameter, should be branded on one end of each case.

Plums for Export.

The most satisfactory method of exporting plums is in trays which measure internally 18 x 11½ x 2¼ inches. These should be lidded separately, with cleats as described for pears. The cleating of each lid is most important, as free circulation of air between each tray is then permitted.

All plums for export should be of large, bold appearance (the larger the better), without blemish, and retaining the stalk. The fruit should be wrapped in sulphite wrappers, packed in single layers on the diagonal system, and the total number of plums stamped on the end of each tray.

Before packing, a reasonable amount of well teased out wood-wool should be placed in the bottom of the tray, then a sheet of tissue paper. The fruit should then be wrapped and packed and covered with a sheet of tissue paper and wood-wool.

The successful export of plums depends largely upon immediate and thorough precooling. If the packages are made with close-fitting boards and a reasonable amount of wood-wool used, it will be found that these will act as an insulation against variations in temperature, &c.

For the London trade the following varieties are in demand:—President, Jefferson, Washington, Grand Duke, Ponds Seedling, and Satsuma. Small plums are not wanted.

Bacon Curing on the Farm

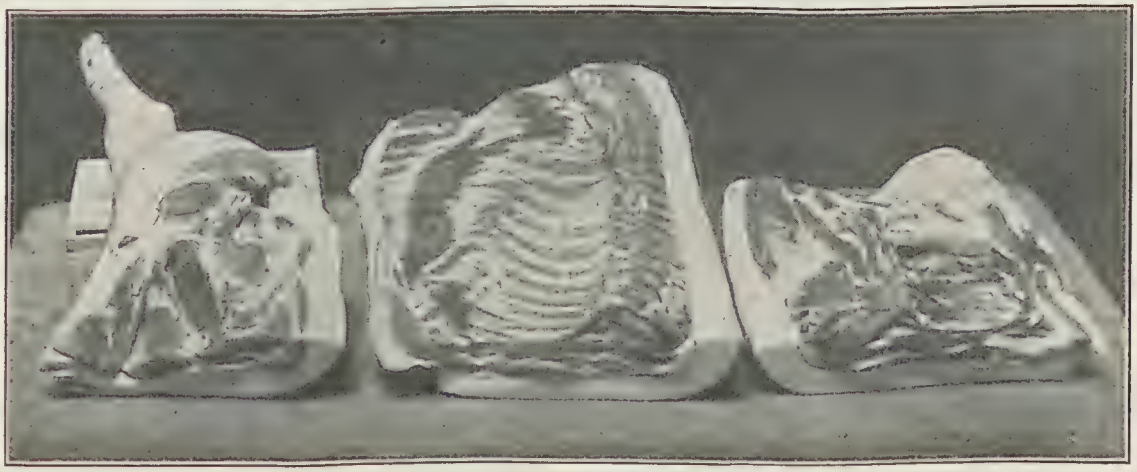
By H. C. Churches, Dairy Supervisor.

IN *Rural Life in England during the Seventeenth Century* it is stated that all the available live stock suitable for the purpose were slaughtered and salted down during the cold months and stored, and great flitches of bacon hung in the kitchen and store-room. This, of course, was before the advent of the refrigerator, and the killing of stock and salting of the flesh was the usual method of providing a supply of meat for future use. Gradually, however, the curing of bacon, as well as the manufacture of butter and cheese for sale, became an important part of the general dairy farming operations, and the products were marketed direct from the farm.

In Victoria, and probably in most parts of the world, conditions have changed, and each part of the dairy farm operations has become specialized. The conditions to-day are that the man who milks the cows frequently knows little about the manufacture of butter or cheese; these are technical operations which are carried out in the big co-operative and other factories. Very few dairy farmers now even make enough butter for their own use, and few cure their own bacon. Yet much less than half a century ago there was scarcely a farmhouse in the country districts in which one would not find during the winter a supply of home-cured bacon. But at the present time not many of our younger generation of dairy farmers appear to possess the knowledge of how to home-cure bacon, and this may to some extent explain why more bacon is not eaten in the country districts.

The Type of Pig Required.

It is comparatively easy to cure bacon on the farm during the cold time of the year—June and July are the months most favoured. Practically no outlay for plant is required. Good bacon, however, cannot be made from poor quality pork. What is necessary is a well-fed and quickly-fattened pig of good type weighing from 180 to 200 lb. (live weight); this weight should be reached when the animal is about five to six months of age. The old custom of keeping pigs intended for bacon for two or three years, at which age they would perhaps yield from 3 or 4 cwt. of pork, dressed weight, meant a coarse flesh, which is not relished by the present-day consumer. With the heavier pig there is also considerable waste, owing to surplus fat; such pigs are best disposed of as "back-fatters," and their carcasses are used chiefly in the making of small goods.



A Side cut up ready for Curing.

Slaughtering.

A pig should not be given any solid food for the 24 hours before killing. It may, however, have free access to water.

The killing should be done during the afternoon or in the evening so that the cold night air can effectively "set" the flesh.

A tub, vat, or cask may be used for scalding. If a receptacle large enough to hold the whole carcass can be obtained, so much the better. Usually, however, it will be necessary to scald half the carcass at a time. A rope should be attached to the hind leg and the animal raised by means of a pulley and the head and forequarters lowered into the water. When the hair will come away readily the carcass should be hoisted from the water; the rope should then be attached to a front leg and the hind part of the carcass immersed.

Where no receptacles are available for immersing the carcass it may be laid on a bench and covered with bran bags, which should be well tucked in around it, and water, which has been brought to boiling point, poured over the whole carcass. The water soaking readily through the light bagging will give a very good scald, and when the hair is removed from one side the carcass may be turned over and the scalding operation repeated.

When a tub or vat is available, water at a temperature of about 145 to 150 degrees F. should be used for the scald, but if the work be done in the open air, or if the scalding vat be small, the pig wet, or the day very cold, the temperature should be increased somewhat. When the carcass is immersed, twist and move it about in the water so that all portions of the body will be properly scalded. As soon as the hair and surface skin are loosened the carcass should be removed from the scalding vat to a bench or table, and the hair scraped from it as quickly as possible. While it is being scraped it should be liberally douched with cold water. If it can be kept in a large tub of cold water while being scraped and cleaned, so much the better. If a tub of cold water cannot be provided, a bucket or two will suffice, or, if convenient, a small jet from a hose may be turned on the carcass to keep it wet.

Immediately after the scraping and cleaning the carcass should be hung up and the intestines, heart, lungs, and kidneys removed. While the flesh is still warm and soft, the carcass is split down the centre of the back; this is termed "backing down." Many amateurs leave the "backing down" until the flesh is set, but a neater and better job will result if this operation be performed whilst the flesh is warm.

In the morning, when the carcass has set, the head and feet should be cut off and put in pickle and all surplus fat removed. The fat is cut into small pieces about an inch square and boiled for some time. The liquid fat should be passed through a fine strainer and then stored in jars or basins. The backbone and breastbones are removed, and usually on the farm the ribs as well. (In bacon factories it is not customary to cut out the ribs.) It also facilitates curing if the shoulder blade be removed. This should be done as neatly as possible by passing the knife through the joint and then round the blade. In a factory each operator has a piece of cord attached to his belt, and this he slips over the end of the joint of the shoulder blade, and thus he is easily able to pull the blade out as he cleans the flesh away with the knife.

In factories it is usual to cure the whole side in one piece, but on the farm it is generally much handier to cut the sides before curing, especially if the curing is to be done in pickle. The shoulder is cut off straight across at the third rib; the ham is cut off below the aitch bone, and the cut end is rounded slightly to give the ham a better shape. Thus, for home curing it is usual to cut a side into three pieces—shoulder, middle, and ham.

Curing.

The curing can be done either by the dry-salting method or in brine. Mild curing is not altogether advisable where the bacon is likely to be held for any length of time; it is only satisfactory when the bacon is intended for immediate sale. Brine curing is the method recommended for the farm, though in the dry-salting process an advantage is that a watertight tub or box is not necessary. For brine curing mix these ingredients together in a watertight barrel or box:—28 lb. salt (best dairy salt for preference), 4 lb. cane sugar (white or brown), and 8 oz. saltpetre, and add sufficient rain water to make a saturated solution. (If rain water be not available, then use water that has been boiled.) The brine should be sufficiently buoyant to float a fresh egg or a potato. The use of a brine needle (which can be purchased for a few shillings) is recommended. This can be fitted into the hose end of the ordinary kerosene tin spray

pump. The needle should be run along the bones and the brine injected with the pump in a couple of places, particularly the hams and shoulders. This greatly assists the successful curing of the flesh around the bone. If the brine tub is large enough, a side can be cured in one piece; if not, it will have to be cut into convenient sizes. When placing in the brine tub, be sure that the flesh is covered with brine. Every two or three days "turn" the sides or pieces, as the case may be, so that they will lie in a different position from that just previously occupied. It is imperative that the brine be kept up to full strength by the addition of a little more of the salt mixture from time to time. In about 21 days the bacon may be removed from the brine. It is always advisable, whilst curing bacon, to keep it away from strong sunlight. The brine tub should be kept in a darkened position, and when the bacon is being dried preparatory to smoking it must not be placed in the sunshine. The light has an oxidizing or bleaching effect, and apart from spoiling its appearance also spoils the flavour.

Brine made in the way suggested will keep for years if after each occasion in which it is used it is heated to a temperature a little below boiling point and the scum skimmed off.

When curing with dry salt place the pork on a table or bench and rub well on both sides with a salt mixture consisting of ingredients similar to those suggested for the making of brine. When the flesh has been thoroughly kneaded the side should be left with the rind downwards, and the fleshy side well sprinkled with the salt mixture. After 48 hours it should be turned and rubbed; this operation must be repeated at intervals of a few days for three weeks. The side should be then washed in luke-warm water and thoroughly dried.

Smoking.

While it is not at all necessary to smoke bacon and ham, many people prefer bacon with the flavour that smoke imparts to it, and the operation can be carried out very easily. Sometimes a small outbuilding which has a brick or an earth floor is used. If such be not available, a large packing case or barrel may be used as a makeshift. Whatever receptacle is used should be set on bricks some inches from the ground. The bacon should be hung from a crossbar. The smoke should be turned into the receptacle, or if possible conveyed to it by means of piping, so as to avoid excessive heating. If a fire were placed within the receptacle there would be a danger of the bacon becoming heated. Clean straw covered with sawdust is the best material for producing smoke. If bagging be hung around the case or barrel used, it will prevent the smoke from escaping as readily as it might do otherwise.

A point to be observed before hanging bacon for smoking is to dry it thoroughly, for if any moisture remains on it when placed in the smoke-room the flesh is liable to become very dark.

That portion of the bacon which is not required for immediate use will keep quite fresh for months if sewn in calico or in sound hessian, and placed in a box and well covered with clean dry wood ashes from which the cinders have been sifted. The box should be kept in a cool dry place.

1930 Journal Index.

The index of this *Journal* for the year 1930 (Vol. XXVIII) has now been printed. Copies will be sent post free to subscribers applying for same.

"Target Spot" of Tomato Seedlings.

A Note on the Control of the Disease in the Nursery.

By S. Fish, M.Agr.Sc., Assistant Plant Pathologist, Plant Research Laboratory.

NURSERYMEN raising tomato plants for growers sometimes experience serious outbreaks of Target Spot disease, caused by the fungus *Macrosporium solani,* E and M.

On the leaves the disease occurs as dark-brown or black circular or irregular spots, which often show concentric rings or ridges, hence the name Target Spot. These spots are at first small, but under favorable conditions they increase rapidly and run together. The lower leaves are generally the first to be affected; these turn yellow, wilt and die. The disease may make rapid headway, involving the leaf, leaf-stalk, stem, and collar of the plant, where the areas attacked may die.

The disease first appears when the seedlings are in the seed-boxes on the warm tank, but generally not more than a very small percentage, say twelve seedlings in 3,000, are affected at this stage. Although these diseased seedlings are discarded when the seedlings are pricked out into boxes containing 220 plants, many of these pricked-out plants develop the disease while in the hot and cool houses. In the cool frames, under favorable conditions for the disease, every plant in the box eventually may develop Target Spot.

The fungus *Macrosporium solani* responsible for the trouble has dark chestnut-brown vegetative strands, which ramify through the

A Tomato Seedling affected with "Target Spot".

affected tissue. From the surface of these spots arise numerous short stalks, at the tip of which brown, club-shaped spores are produced. Several crops of spores may arise from the diseased spots. The spores, which can germinate in less than 48 hours, are probably carried from the diseased to the healthy plants by air currents or by water splashes. Several germ tubes are sent forth from one of the many cell spores, and these, under favorable conditions, will infect the plant. Plants which are not in full vigour from any cause are more liable to attack. Excessive moisture seems to be more important than temperature for infection.

Control.

Under epidemic conditions, the following method, which has proved successful in combating the disease, may be applied:—

1. In the morning, spray lightly with Bordeaux Mixture (6.4.40), using a very fine nozzle on the young seedlings in the seed-boxes. This may be given about a day after the seedlings are taken from the warm tank, and while they are still in the hothouse.

2. After the pricking out of the seedlings, allow time for the plants to recover from this operation before applying a similar spray at intervals of three days, during the time they are passing through the hot and cool houses. The spray should always be given in the morning, and the plants watered about two hours after the application. Care should be taken that the fine spray is given lightly so that it may not collect in a pool in the centre of the plant and injure the young growth.

3. When the plants are in cool frames, spray twice a week, and water the foliage about 20 minutes after spraying, in order to prevent large blotches of Bordeaux Mixture drying on the foliage, as this may arouse suspicion on the part of the buyers, and interfere with the marketing of the plants.

4. Spray the benches of the hot and cool houses thoroughly with Bordeaux, as well as the inside of the cool frames.

The Bordeaux Mixture 6.4.40 is made up as follows:—

Dissolve 6 lb. of bluestone in 20 gallons of water; slake 4 lb. of quicklime in a little water, and bring it up to 20 gallons. Pour the two lots of 20 gallons simultaneously into a third barrel, and a good sky-blue coloured liquid should result.

The effectiveness of Bordeaux spray in preventing the spread of this disease may be seen from the following experiment:—

Sixteen boxes of plants, showing approximately a similar number of diseased plants, were taken, and eight of the boxes received four light sprayings with Bordeaux Mixture. These boxes continued through the cool-houses and cool frames, and were examined sixteen days after receiving the first spraying. The difference between the two lots was very striking. Two typical boxes of sprayed and unsprayed were selected, and the number of diseased plants in each case was counted. The unsprayed boxes (containing 220 plants per box) showed 95 per cent. and 99 per cent. of diseased plants respectively, whereas the sprayed boxes showed 17 per cent. and 18.1 per cent. of diseased plants. The infection in the sprayed boxes was very slight as compared with that in the unsprayed plants, and probably consisted of the original diseased spots, plus the spots produced from infections which had taken place just prior to spraying, but which at that time had not produced the typical lesion.

The F.A.Q. Wheat Sample

Satisfactory Milling Quality

By W. R. Jewell, M.Sc. Agricultural Research Chemist.

THE f.a.q. wheat sample this year has been discredited to a certain extent on account of its abnormally low bushel weight (58½ lb.) and the presence of bleached and pinched grain. That the sample is by no means as bad as its appearance and bushel weight would suggest is shown by some very interesting data obtained by an examination, in the Departmental laboratory, of a portion of the official sample. Each year the f.a.q. sample is critically examined and subjected to analysis and to a milling test in the experimental flour mill.

The outstanding feature of this year's sample is that a high yield of flour, with protein and gluten contents higher than the average for the past four years, was obtained. This flour, in spite of inferior gluten quality, yielded a better loaf than has been obtained with the f.a.q. sample since 1927, when these investigations were inaugurated. It would appear, therefore, that neither the miller nor the baker will be adversely affected by any unsatisfactory features of this year's f.a.q. wheat.

Wheat.

The moisture content, as would be expected from the rain which fell prior to and during harvest, is somewhat higher than usual. The percentage of impurities is slightly higher than normal, and the protein content (10.97 per cent.) is a little better than average. Analytical results, compared with the past four years, are—

—	1927.	1928.	1929.	1930.	1931.
	%	%	%	%	%
Moisture	9·47	9·41	9·20	10·58	11·43
Impurities (screenings)	3·4	2·5	3·4	2·7	3·5
Ash	1·36	1·47	1·26	1·33	1·47
Protein (N. × 5.7)	9·28	11·63	10·11	10·87	10·97

Flour.

Although the sample contained some pinched grain, no difficulty was experienced in milling, and the yield of flour was higher than in previous years. The protein and gluten contents were slightly better than the average of past years, but the gluten quality was decidedly inferior, lacking normal elasticity. In spite of this, the standard baking test, which is the ultimate criterion of flour quality, yielded an excellent loaf of good crust and crumb, and of considerably greater volume than has been obtained with the f.a.q. sample previously. It is possible that the bleached grain, owing to its being wetted when near maturity, has developed a high diastatic value, and that the gluten, although apparently inferior, is sufficiently strong to retain all the gas evolved during proving and baking. This point is to be the subject of further investigation. Comparative figures since 1927 are—

—	1927.	1928.	1929.	1930.	1931.
Flour—	%	%	%	%	%
Yield	69·5	70·0	70·4	73·2	73·4
Ash	0·53	0·48	0·41	0·49	0·54
Protein (N. × 5·7)	8·26	10·11	9·20	9·54	9·58
Wet Gluten ..	23·6	31·3	25·8	26·4	29·4
Dry Gluten ..	7·9	10·4	8·5	8·6	9·7
Water absorption (qts.) ..	40·2	45·0	45·2	41·0	40·5
Standard Loaf Volume (c.c.) ..	1,580	1,680	1,525	1,610	1,760

Bran and Pollard.

Normal yields of bran and pollard were obtained, and the protein content of both was higher than for the past two years.

—	1927.	1928.	1929.	1930.	1931.
	%	%	%	%	%
Bran—					
Ash	3·76	3·68	3·67	3·55	4·27
Protein (N. × 6.25)	12·60	15·77	13·52	15·31	15·57
Pollard—					
Ash	2·29	3·26	2·52	2·47	3·17
Protein (N. × 6.25)	14·25	17·50	14·83	15·09	15·42

Orchard and Garden Notes

By Edward E. Pescott, F.L.S.

The Orchard.

IN heavy soils, or where manure has not been applied for some time, a crop of green manure may be useful. This is always sown down in autumn, and the earlier the crop can be sown, the stronger and more abundant will be the growth. It is usual to choose a leguminous crop, such as field peas of any variety, tick, or horse beans, or even strong-growing clovers. To these, perhaps, would be added barley, tares, or rape. Any strong-growing plant that produces an abundance of leafage would be useful for the purpose.

Late Rose Tulips.

It is important that a vigorous growth shall be obtained before winter, as little growth is made during that season. For that reason an early autumn sowing is urged, to allow for as long a period of growth as possible. In order to assist the growth, superphosphate at the rate of 1 cwt. per acre usually is sown with the crop.

In the home garden, all citrus trees should be given a dressing of sulphate of ammonia, using 1 lb. for a fully matured tree, and less for smaller and younger ones. A similar dressing of lime should be given to other fruit trees, particularly to figs.

The Flower Garden.

The time has arrived for planting spring-flowering bulbs, such as daffodils, watsonia, tulip, freesia, hyacinth, ranunculus, anemone, and others. The annual growth of a bulb does not continue over a long period, and roots are made very rapidly. Bulbs are gross feeders, and the plant food should be placed where the roots can readily reach it.

The best manures, apart from animal manure, are either bone or blood manure, or both. Animal manures, however, should be given sparingly to anemones. The manure is worked into the soil so that it is from 3 to 6 inches down, just where the roots can reach it. The bulbs should be planted with their tips no shallower than 2 inches from the surface. It will be advisable to trample the soil before planting.

All bulbs may be planted from March to May; early planting is always advisable, except for anemone, which gives the best results from late planting.

All of these bulbs thrive if given a lime dressing; this should be given, using about 6 oz. per square yard, when the growth is just appearing above the surface.

Lawns should be top-dressed now, especially if they have been weakened by play or traffic. Buffalo and couch lawns may be excluded from this work, as they prefer a spring dressing. Other lawns should be encouraged to make their vigorous growth in early autumn.

The material for dressing will depend largely on the soil in which the lawns are growing. For heavy soils, the best top-dressing is a clear fine sand. There is enough nourishment in the heavy soils for the grass, while the sand forms a cool mulch for the surface roots to work in, preventing, at the same time, a cracking of the heavier soil.

For light, sandy soil, however, some good loam, even a sandy loam, or the siftings from the litter and manure heap, should be used, so that the lawn shall be nourished as well as mulched. Starved lawns should be given blood manure, sprinkled over and watered in; weedy

[*Continued on page* 140.

Fertilizer Inspections

Report for 1930

By W. C. Robertson, Chemist.

THE task of inspecting fertilizers offered for sale in the State belongs to the Chemist's Branch of the Department of Agriculture. Of course, no attempt is made at a special inspection of every ton of fertilizer manufactured in or imported into Victoria; this would be as impracticable as it is unnecessary. The Fertilizers Act can be adequately administered by an examination of a reasonable proportion of the total output.

Endeavours are made to keep in touch with the trade and the consumer, and when circumstances warrant, to make rigid and close inspection at the source of the output of any material of a suspicious nature. In addition, flying visits by inspecting officers are paid to factories which produce the main artificial fertilizers and supply the farmer with the greatest tonnage annually. Advantage is taken of section 17 of the Act, which permits the Chemist of the Department or his deputy to have free access at any reasonable time to any shop, store, &c. (but not to a farm), where artificial fertilizer is stored prior to sale. Samples may be taken of any artificial fertilizer, and the samples subsequently are analysed in the Department's laboratory. Should an analysis prove that a fertilizer is

Sampling Stocks of Artificial Fertilizers at Victoria Market, Melbourne.

Analysing Fertilizers in the Departmental Laboratory.

in any respect below the manufacturer's guarantee by more than the prescribed limits, a prosecution ensues.

During the year 1930, 38 samples of various brands of artificial fertilizers were taken from stocks at factories or stores. Five samples of the 38, equal to 13 per cent., were found on analysis to be deficient in one or more of the constituents guaranteed, to an extent exceeding the limits allowed by the Act, and in four out of the five cases successful prosecutions were instituted. The fifth case failed on a technical objection. The sale of an unregistered fertilizer also formed the basis of a successful prosecution.

Details of these cases are given below. It should be noted that the "calculated value" is the computed value based on the actual analysis of the sample. The "guaranteed value" is based on the guaranteed analysis as shown on the label. Ruling "unit values" are, of course, used in both cases.

Case A.—Blood and Bone Fertilizer.

The sample was proved to be deficient in total phosphoric acid, the percentage deficiency being equal to 18 per cent. The "guaranteed" value was £10 0s. 7d. per ton, whereas the "calculated" value of the fertilizer as it was retailed was found to be £9 8s. 9d. per ton. The monetary loss to the farmer was, therefore, 11s. 10d. per ton.

Case B.—Blood and Bone Fertilizer.

The sample was proved on analysis to be deficient in both nitrogen and phosphoric acid, the nitrogen percentage deficiency being 17.8, and the percentage deficiency in phosphoric acid being equal to 10.27.

As a matter of fact, this was a bad case of adulteration in that a cheaper form of nitrogen, in the form of sulphate of ammonia, was added to the blood and bone. The actual percentage deficiency in nitrogen as blood and bone was 52 per cent.

The unit value for nitrogen as blood and bone (22s. 5d.) is considerably higher than that of nitrogen as ammonia (14s. 6d.), so that this adulteration would mean a saving of money to the manufacturer.

Presumably the deficiency of nitrogen as blood and bone was to be remedied by the addition of a cheaper form of nitrogen in sulphate of ammonia, but the analyst by chemical means is able to determine not only the amount of nitrogen, but also the various forms in which it is present, and thus the adulteration was readily detected. Further, the addition of sulphate of ammonia containing no phosphate reacted against the manu-

facturer in another way, by reducing the phosphoric acid content of the sample below guarantee.

The "guaranteed" value of the fertilizer was £9 6s. 1d. per ton, whereas its value calculated on the analysis of the sample as retailed was £7 4s. 9d. per ton. In other words, the fertilizer was £2 1s. 4d. under value.

Case C.—Blood and Bone.

This sample represented a very low grade fertilizer—"green" and badly manufactured. The analysis disclosed a percentage deficiency of 53.4 in nitrogen and 17 in the case of prosphoric acid.

The "calculated" value per ton was £6 6s. 4d., whereas the "guaranteed" value was £10 8s. 9d., meaning a direct loss of £4 2s. 5d. to the farmer on every ton of the fertilizer purchased.

In the foregoing cases, it is a comparatively simple matter to calculate the apparent monetary loss to the farmer by the unit value system, but to compute the real loss is more difficult, for it is obvious that a depreciated yield will follow the use of an inferior fertilizer, thereby increasing the cost of production—a serious matter at any time, but much more so in times like the present.

Case D.—24 per cent. Superphosphate.

The analysis of this sample of fertilizer proved a percentage deficiency of 4⅓ in its phosphoric acid content.

The "calculated" value was £4 17s. 6d. per ton against the "guaranteed" value of £5 0s. 9d.—a difference of 3s. 3d. per ton against the farmer.

It will be noticed that this brand of superphosphate (24 per cent.) does not appear in the list of the brands registered for the 1931 season (see January issue of this *Journal*).

This is due to the fact that the Director of Agriculture refused to register the brand on the grounds that it is substantially identical with "22 per cent. super.," or so nearly resembles it as to be likely to deceive, the difference between 22 per cent. super. up to guarantee and 24 per cent. super. less deficiency limits allowed under the Act being negligible.

Case E.—Super. and Bone.

The sample was found on analysis to be slightly deficient in phosphoric acid, the percentage deficiency being 1.22. The "calculated value" was £6 12s. 1d., and the "guaranteed value" £6 16s. 11d. per ton, the monetary difference per ton being 4s. 10d. in favour of the manufacturer. There was no suggestion of an attempt to defraud in this case, but proceedings were instituted because the farmer is entitled to receive what is guaranteed.

Case F.

This was not a case of a fertilizer being below the manufacturer's guarantee, and therefore differs from the foregoing. An importer continued to sell an imported fertilizer, although the Department of Agriculture had refused to register it. The vendor thereby violated one of the most important sections of the Act by selling an unregistered fertilizer. It was retailed at £18 10s. per ton, whereas the "guaranteed value" computel on the unit value basis from the guaranteed analysis submitted was £6 10s. per ton.

General.

By far the greater portion of the artificial fertilizers sold throughout the State annually can safely be assumed to be of guaranteed quality, but the instances quoted show the need for vigilance in administering the Act. In addition, ever since the passing of the first Fertilizers Act, instances of exploitation have been discovered. A case came under notice during the past season where a fertilizer was sold which bore a fictitious analysis alleging it to be highly concentrated. The price charged was £28 per ton. Examination showed the composition to be ordinary blood and bone, worth about £9 per ton. Of course, not much of this material was sold, but the fact that any was sold indicates that it is possible to retail an unregistered fertilizer at an exorbitant price to farmers, heedless of repeated warnings.

Once again, farmers are warned to exercise discretion in the purchase of fertilizers for which extravagant claims are made. No matter what the terms of sale, the personality and appearance of the seller, his propaganda and guarantees, should the fertilizer present any unusual features, or be unknown to the farmer, he would be well advised not to sign any order or document until he has made inquiries from the Chemist for Agriculture. It is highly desirable that full information be sought before purchase, as it is generally too late to take action afterwards.

The appended table, showing the analyses of the samples collected during the year, together with the percentages of plant food guaranteed in each case, calls for no comment.

Hereunder is a summary computed from the fertilizers compared with the "guaranteed" samples collected showing the value of the value:—

Brand of Fertilizer.	Value Calculated from Analysis Found.	Value Calculated from Analysis Guaranteed.
	£ s. d.	£ s. d.
Superphosphate (av.)	4 13 2	4 13 7
Sulphate of Ammonia	15 2 3	14 18 7
Nitrate of Soda	15 1 0	14 19 8
Blood Manure	9 16 8	9 4 0
Blood and Bone and Animal Fertilizer (av.)	9 4 1	9 4 1
Nitro-Super.	4 8 11	4 8 10
Bone and Super. / Super. and Bone (av.)	6 4 8	6 3 11
Ammonia and Phosphate	5 14 4	5 15 8
Phosphate 50/50	4 17 1	4 16 2
Mixed Manures (av.)	8 2 2	7 19 9

FERTILIZERS ACT INSPECTION.—SEASON 1930.

Results of the Analyses of Official Samples collected and taken under Section 17, *Fertilizers Act* 1928.

Lab. No.	Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.								Potash as Sulphate.	
			As Ammonia.		As Bone and Blood.		Total.		As Water Soluble.		As Citrate Soluble.		As Citrate Insoluble.		Total.			
			Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
			%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
128/30	Sulphate of Ammonia	M.G. Co. in diamond	20·84	20·59	..	..	20·84	20·59	..	..	..	..	..	..	..	..	..	..
102/30	Nitrate of Soda ..	Wischers ..	15·57	15·50	..	..	15·57	15·50	..	..	..	..	..	..	..	..	..	..
			As Nitrate.															
212/30	Blood Manure ..	M.C.C. in diamond	..	..	8·52	8·02	8·52	8·02	..	..	..	..	..	..	1·16	1·25	..	..
					As Blood.													
129/30	Superphosphate, 22%	Sickle in diamond	..	..	..	..	..	..	20·27	20·50	·50	·50	1·19	1·00	21·96	22·00	..	..
231/30	,, ,,	,, ,,	..	..	..	..	..	..	20·32	20·50	·32	·50	1·22	1·00	21·86	22·00	..	..
239/30	,, ,,	,, ,,	..	..	..	..	..	..	20·36	20·50	·35	·50	1·22	1·00	21·93	22·00	..	..
240/30	,, ,,	Pivot ..	..	..	..	..	..	..	19·85	20·50	·42	·50	2·13	1·00	22·40	22·00	..	..
438/30	,, ,,	Sickle in diamond	..	..	..	..	..	..	20·93	20·50	·36	·50	·51	1·00	21·80	22·00	..	..
441/30	,, ,,	,, ,,	..	..	..	..	..	..	20·65	20·50	·43	·50	·42	1·00	21·50	22·00	..	..
617/30	,, ,,	Pivot ..	..	..	..	..	..	..	20·20	20·50	·65	·50	1·21	1·00	22·06	22·00	..	..
619/30	,, ,,	Cresco ..	..	..	..	..	..	..	20·25	20·50	·65	·50	1·72	1·00	22·62	22·00	..	..
232/30	Superphosphate, 24%	,, ..	..	..	..	..	..	..	21·70	22·00	·80	·50	1·77	1·50	24·28	24·00	..	..
235/30	,, ,,	Cresco* ..	..	..	..	..	..	..	21·19	22·00	·67	·50	1·10	1·50	22·96	24·00	..	..
334/30	,, ,,	Sickle in diamond	..	..	..	..	..	..	21·26	22·00	·77	·50	1·95	1·50	23·98	24·00	..	..
230/30	Bone and Super. No. 1	,, ,,	..	..	2·03	2·00	2·03	2·00	11·25	11·38	3·90	3·08	4·60	5·32	19·75	19·78	..	..
238/30	Super. and Bone ..	Cresco ..	..	..	·79	1·00	·79	1·00	17·72	16·10	1·66	1·10	1·75	3·60	21·13	20·80	..	..
337/30	Super. and Bone No. 2	Sickle in diamond	..	..	·98	1·00	·98	1·00	16·71	15·95	1·32	1·79	2·70	3·16	20·73	20·90	..	..
439/30	Bone and Super. No. 1	,, ,,	..	..	2·55	2·00	2·55	2·00	10·30	11·38	5·57	3·08	3·43	5·32	19·30	19·78	..	..
444/30	Super. and Bone, No. 2	Sickle in diamond*	..	..	·98	1·00	·98	1·00	15·11	15·95	2·69	1·79	1·88	3·16	19·68	20·90	..	..
445/30	Bone and Super. ..	Cresco ..	..	..	1·92	2·00	1·92	2·00	11·61	9·50	2·87	3·90	2·30	3·00	16·78	16·40	..	..
620/30	,, ,, ..	,, ..	..	..	2·04	2·00	2·04	2·00	10·39	9·50	3·42	3·90	2·86	3·00	16·67	16·40	..	..
336/30	Nitro-Super. ..	Sickle in diamond	1·76	1·50	·46	·50	2·22	2·00	17·59	16·69	1·10	1·12	1·17	2·01	19·86	19·82	..	..
237/30	Ammonia and Phosphate	Cresco ..	1·76	2·00	..	..	1·76	2·00	8·43	8·30	1·71	1·60	16·13	15·70	26·27	25·60	..	..
236/30	Super. and Phosphate	Cresco 50/50	..	..	..	..	..	..	8·85	9·16	1·61	1·84	18·60	17·40	29·06	28·40	..	..
211/30	Dissolved Guano ..	Not registered*	5·04	5·00	..	..	5·04	5·00	9·59	7·00	·90	1·63	·37	1·37	10·86	10·00	1·51	1·47
234/30	Mixed manure ..	Cresco, No. 2	1·10	1·00	1·41	1·40	2·51	2·40	11·67	11·25	2·82	2·00	2·85	4·50	17·34	17·75	4·52	5·00
335/30	Market Garden Manure	Sickle in diamond	1·61	1·50	2·11	1·56	3·72	3·06	10·51	10·82	3·14	2·44	3·31	4·25	16·96	17·51	2·21	2·42
338/30	Complete Manure ..	Sickle in diamond, No. 1	2·30	2·50	..	..	2·30	2·50	14·15	14·87	·56	·36	·73	·72	15·44	15·95	7·10	7·26
618/30	Mixed Manure ..	Cresco, No. 2	·95	1·00	1·32	1·40	2·27	2·40	12·79	11·25	2·33	2·00	3·27	4·50	18·39	17·75	4·82	5·00

* Prosecution Sample.

FERTILIZERS ACT INSPECTION.—SEASON 1930.

Results of the analyses of Official Samples collected and taken under Section 17, *Fertilizers Act* 1928.

Lab. No.	Description of Fertilizer.	Brand.	Nitrogen.		Phosphoric Acid.					
			As Blood and Bone.		Citrate Soluble.		Citrate Insoluble.		Total.	
			Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
			%	%	%	%	%	%	%	%
130/30	Blood and Bone* ..	Pridhams ..	5·49	5·32	6·78	9·30	6·34	6·70	13·12	16·00
100/30/2	Blood and Bone ..	W & M in circle ..	6·22	6·00	5·87	4·50	4·43	5·50	10·30	10·00
100/30/1	Animal Fertilizer ..	Pannifexs, No. 2 ..	4·98	4·50	8·22	5·00	9·61	12·00	17·83	17·00
213/30	Blood and Bone ..	Cockbills ..	5·68	5·25	7·55	3·00	6·87	9·00	14·42	12·00
214/30	Animal Fertilizer ..	A.N.A. Surprise ..	6·24	5·00	8·34	4·00	3·76	10·00	12·10	14·00
233/30	Blood and Bone ..	Cresco	5·95	5·00	8·27	3·00	5·77	11·50	14·04	14·50
440/30	Blood and Bone* ..	Kings, Geelong ..	2·33	5·00	5·48	6·90	7·39	8·60	12·87	15·50
442/30	Blood and Bone ..	Cresco	5·82	5·00	8·05	3·00	4·75	11·50	12·80	14·50
443/30	Blood and Bone* ..	Corio	2·40 (Total Nitrogen) 4·11	5·00	5·49	6·50	7·97	8·50	13·46	15·00

* Prosecution Sample.

Melbourne, 6th February, 1931.

W. R. JEWELL, M.Sc., F.I.C.,
Chemist for Agriculture.

Orchard and Garden Notes

(*Continued from page* 135.)

lawns should have a good dressing of sulphate of ammonia.

Roses should be encouraged into good growth by a mulching of stable manure, or a slight sprinkling of blood manure. Aphis and mildew are now to be watched for; the bushes should be sprayed with nicotine sulphate or Cleansel for the former, and dusted with sulphur for the latter.

The Vegetable Garden.

Last month's notes should be read over again and the work outlined there continued. In cool districts, rhubarb crowns, especially the winter and "all-the-year" varieties, may be transplanted. Rhubarb is a very heavy feeder, and, except in exceptionally rich soil, should not be left in the same place for more than three successive years. In transplanting, it is hardly possible to make the soil too rich. The crowns should be trimmed of all old and decaying roots, and if any bulb mite be present they should be dusted with Cliff's Insecticide.

Asparagus beds may be well dressed, with animal manure of any kind, or with bone and blood mixed. If any gaps have appeared in the bed, the remaining plants should be examined for mealy bug or bulb mite. If either be present Cliff's Insecticide should be given.

Potato and tree onions, garlic, and shallots should now be planted out, giving them a good soil for their growth. Plants of the cabbage family and seeds of carrots and similar plants may still be planted and sown, according to last month's directions.

Professional Papers

[This section is devoted to professional papers and articles of a scientific character.]

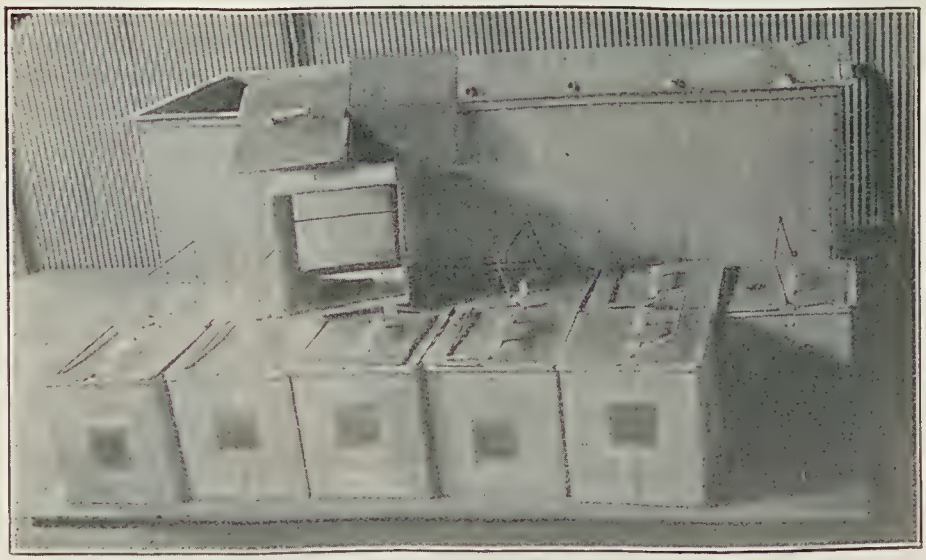
The Control of Loose Smut in Wheat

By D. B. Adam, B.Agr.Sc., Plant Pathologist, and R. T. M. Pescott, M.Agr. Sc.

LOOSE smut of wheat (*Ustilago tritici* (Pers.) Jens.) is universally present in the wheat-growing districts of Victoria. The damage done fluctuates from year to year, but on the average this disease probably is responsible for a loss equal to from 1 to 2 per cent. of the crop.

The Jensen hot-water treatment for a long time has been the standard method for the treatment of this disease. Apparently the method is quite satisfactory, but it is laborious and tedious, and results in soft, swollen grain which is difficult to handle.

With a view to eliminating loose smut from the seed wheat raised at the State Research Farm, Werribee, a test was made of the single-bath hot-water treatment for loose smut in wheat as devised by V. F. Tapke.* Fortunately for our needs, a supply of wheat comparatively heavily infected with loose smut was obtained in 1926, and during the next three years extensive trials were conducted with this seed, and with other seed from the same source, with the outcome that it was established that an infected seed sample soaked for 1 hour 40 minutes in water maintained at a temperature



Hot Water Tank and Buckets.

* U.S.A. Department of Agriculture Bulletin, No. 1383.

of 120 deg. F. produced a crop practically free from the disease. The treatment has a depressing effect on the germination, and as the process is one involving considerable trouble its use by private farmers is not recommended. The process, however, clearly has advantages for use on seed stations in order that seed raised at these institutions for distribution to farmers shall be free from loose smut. As a result of the trials described here, the treatment is now being applied to seed wheat raised at the State Research Farm, Werribee.

The Treatment.

The apparatus consisted of a heavy galvanized iron tank, 6 ft. x 2 ft. x 2 ft. 6 in., strengthened with angle iron so arranged as to support twelve galvanized iron buckets, shown in the accompanying illustrations. Each of these buckets is provided with a lid of gauze, and has a capacity of one cubic foot. The sides and bottom have insertions of brass wire gauze to permit of the free movement of water in all directions through the wheat. The buckets are supported by angle iron at a distance of six inches from the bottom of the tank. In the space under the buckets there is a perforated steam pipe running three-quarters the length of the tank. The apparatus was placed in the dairy building at the Werribee Research Farm, where the steam heating pipe of the tank could easily be connected through a steam valve to the dairy boiler. In the bottom space there is also a pipe connected with a 1-in. electrically driven centrifugal pump. The water from the pump is discharged at intervals along the top length of the tank through outlets, the position of which may be seen in the illustration. The pump, by removing water at the bottom of the tank, causes the water above and around the wheat being treated to move to the bottom, and hence it produces a circulation. Approximately half a bushel of dry wheat was placed in each of the twelve buckets. After treatment the swollen grain usually filled the bucket.

In preliminary trials it was found that when the circulating pump was working it was quite easy to control the temperature of the water in the tank to within 1 deg. F. of any desired temperature for any period up to 2½ hours. This control could be obtained by the hand manipulation of the steam valve. Further, we found that the wheat, when added bucket by bucket, did not appreciably affect the temperature of the tank water, and that thermometers placed in the wheat mass while the apparatus was working attained the temperature of the surrounding water in one minute.

Experimental Work.

The seed used in the loose smut trials was mostly wheat obtained each year from a Western District farmer, whose crop in 1926 was observed to be severely affected with loose smut. The infection of the seed grown on this farm each year varied considerably, but was always sufficiently heavy to permit our obtaining satisfactory results. Most of the wheat used in the germination trials was grown on the Research Farm. The seed was steeped in hot water at a temperature of 49 deg. C. (120 deg. F.) for varying periods. After treatment, the baskets containing swollen grain were stood on a draining board for a few minutes before being tipped; then the grain was spread out to dry on a sloping iron sheet in the open. After a few hours the wheat was usually dry enough to sow through an ordinary drill. The moisture content of the grain after treatment was approximately 30 per cent., and steps were taken to secure rates of seeding comparable with dry grain.

Since, in theory, the object of the hot-water treatment is to destroy the fungus lodged within the tissue of the wheat grain itself, and since the temperature necessary for the destruction of the fungus is only a little below that which will kill the wheat embryo, it was considered advisable to collect information on the effect of the various treatments on subsequent seed germination, and in some cases on ultimate yield, since that might also be affected.

Effect of Treatment on Germination.

During the first two years germination trials were carried out under both laboratory and field conditions. The laboratory trials exhibited very slight differences in the effects of different treatments. These differences were similar in direction to those existing in the field trials, although of a much smaller order. Since the field trials more closely conform to likely field conditions, discussion will be confined to these field results.

Table I. shows the average percentage germination of several wheat varieties treated with hot water at 120 deg. F. for varying periods. The figures are the average results from three rows each with 50 seeds, season 1927—

made and an indication of their significance obtained, steps were taken to submit the above figures to statistical analysis.

In this way Table IV., kindly prepared for us by Messrs. Forster and Vasey, Agricultural Research Officers, Werribee, has been obtained.

TABLE I.

Treatment.	Variety.					
	Federation.	Free Gallipoli.	Major.	Graham.	Rajah.	Average.
Untreated	60	38	36	40	53	45·4
Hot water, 1 hour 20 minutes	36	12	17	17	13	19·0
,, 1 hour 40 minutes	58	20	30	43	19	34·0
,, 2 hours	46	17	29	24	11	25·4
,, 2 hours 30 minutes	28	8	14	15	11	15·2

Table II. shows figures similar to Table I. for season 1928—

TABLE II.

Treatment.	Federation.		Macs White.	Ghurka.	Free Gallipoli.	Major.	Graham.	Rajah.	Average.
	A.	B.							
Untreated	88	77	61	66	70	45	72	59	67·5
Hot water, 40 minutes ..	80	71	63	63	69	57	75	61	67·6
,, 1 hour	68	65	58	50	51	55	61	50	57·5
,, 1 hour 20 minutes ..	67	68	52	46	51	45	59	52	55·0
,, 1 hour 40 minutes ..	79	54	41	42	40	17	46	53	41·5

NOTE.—Federation A and Federation B are from the same crop and differ from one another only in that sample A was hand threshed and sample B threshed out by machine.

Table III. gives similar figures for season 1929. In addition to the dry controls, plots were sown with seed soaked in cold water for 1 hour 40 minutes. The trial was limited to the variety Free Gallipoli—

TABLE III.

Treatment.	Average Percentage Germination.
Untreated—dry	66
Cold water, 1 hour 40 minutes ..	60
Hot water, 120 degrees, 1 hour ..	53
,, ,, 1 hour 20 minutes	45
,, ,, 1 hour 40 minutes	40
,, ,, 2 hours ..	41

In order that comparisons of the effects of different treatments on germination might be

The figures for Table IV. are derived from the composition of Tables I., II., and III. In this table the composite average for "no treatment" for the three years was obtained by weighting the average values for each treatment in each year, regardless of variety, according to the number of plots used. The percentage germinations for the other treatments for each year were adjusted on the basis of this composite value for "no treatment." This step is necessary, since each treatment is not represented in each year's results.

Table IV. thus gives the final weighted mean value (in percentages) for the various treatments. It also shows the standard error of each mean value. Where the difference in the final average figure is greater than thrice the standard error, the difference can be considered significant.

TABLE IV.

Plot.	Treatment.	Final Average.	Standard Error.
A	No treatment	58·7	1·1
B	Hot water 120° F. for 40 minutes	59·8	1·1
C	„ „ 1 hour ..	50·3	1·3
D	„ „ 9 hour 20 minutes	40·2	1·4
E	„ „ 1 hour 40 minutes	42·3	·8
F	„ „ 2 hours ..	32·6	1·5
G	„ „ 2 hours 30 minutes	19·4	1·1

From this table it is evident that the seed vitality as expressed by its germinative ability is depressed more and more as the period of treatment with hot water at 120 deg. F. lengthens. The period of treatment for loose smut therefore must be kept as short as possible, consistent, of course, with effective control. This is dealt with later.

Effect of Treatment on Yield.

The plots were not designed with the intention of securing precise information on this subject.

Table V. gives the calculated total yield of wheat in bushels from the plots sown with wheat in the manner described. The plots in 1927 were 1-20th of an acre in area, and were sown in triplicate. In the 1928 column each set of figures is the average calculated yield from six plots 1-45th of an acre. The 1929 figure is the average of three 1-45th-acre plots.

The table indicates that under the conditions of the experiment and at the rather heavy rates of seeding employed, viz., 90 and 110 lb. per acre, the depressing effect of the treatment on germination is not reflected in the ultimate yield.

Effect of Treatment on Loose Smut.

The method adopted in obtaining results consisted in counting the actual number of loose-smutted plants in each 1-20th-acre or 1-45th-acre plot. These are the same plots as those from which the yield figures mentioned above were taken.

Each plot was gone through on from two to three separate occasions at approximately fortnightly intervals, starting from the time that the bulk of the plants commenced to flower.

Table VI. gives the average of the counts of loose smut-affected plants in each of the varieties named during the years 1927-28-29. Each figure in the 1927 and 1929 counts is an average of the counts from three plots. The 1928 figures are each an average from six plots.

The percentage of infection of the seed each year was, so far as we were concerned, a matter of chance. The actual numbers of smutted plants in individual plots varied little from the average given above. The figures therefore are quite representative. The results indicate clearly that immersion of infected seed wheat in hot water at 120 deg. F. for 1 hour 40 minutes is almost completely effective in controlling the disease.

TABLE V.

CALCULATED AVERAGE YIELDS IN BUSHELS OF WHEAT PER ACRE.

Treatment.	Federation A, 1927.	Federation B, 1927.	Federation A, 1928.	Free Gallipoli, 1928.
	Bushels per acre.	Bushels per acre.	Bushels per acre.	Bushels per acre.
Untreated seed	15·3	16·1	8·0	17·4
Cold water, 1 hour, 20 minutes	..	..	..	18·8
Hot water, 120 degrees for 40 minutes	15·6	..	7·2	18·2
„ 1 hour	17·3	..	6·7	19·3
„ 1 hour 20 minutes	16·6	17·4	6·9	19·2
„ 1 hour 40 minutes	15·6	17·2	7·0	21·4
„ 2 hours	15·4	..	..	..
„ 2 hours 30 minutes	16·6	..	..	..

TABLE VI.

Treatment.	Federation A (Western District), 1927.	Federation B (Werribee Sample), 1927.	Federation, 1928 (Western District Sample).	Free Gallipoli (Western District).
Untreated	1,603	30	260	42
Cold water, 1 hour 10 minutes	..	..	..	21
Hot water, 40 minutes	..	..	108	..
„ 1 hour	64	..	68	13
„ 1 hour 20 minutes	27	0	24	0
„ 1 hour 40 minutes	3	0	0·7	1·0
„ 2 hours	1	..	..	..
„ 2 hours 30 minutes	..	..	..	..

In 1929 an experiment was devised to determine the effect of dry heat at 120 deg. and 140 deg. F. both on dry wheat and on wheat pre-soaked in cold water for varying periods. A sample of Ghurka wheat suspected of infection was used in this experiment.

Table VII. shows the effect of various treatments on the germination, yield, and loose smut infection in Ghurka wheat.

It is clear that none of the treatments outlined have had an appreciable effect in eliminating the loose smut infection from this sample. These results agree with those of overseas investigators.

None of the treatments used appears to have had a deleterious effect on seed vitality as expressed by the germination and total yield. Further work using higher temperatures might give profitable results.

Summary.

Summarizing our results we conclude that—

(1) Where an infected seed sample is soaked in water maintained at 120 deg. F. for 1 hour 40 minutes the crop produced subsequently will grow practically free from infection.

(2) The treatment has a depressing effect on germination. This effect increases with the length of time of treatment. In spite of this reduction in germination, the total yield of the crop from treated seed was not affected. This may, of course, be due to the fairly heavy rates of seeding used.

TABLE VII.

Treatment.	Average Percentage Germination.	Calculated Yield per Acre in Bushels.	Average Number Loose Smut Affected Plants in each Plot.
Dry seed, 1 hour at 140 degrees	31·3	23·4	61
„ 1 hour at 160 degrees	37·7	24·1	78
„ 2 hours at 140 degrees	46·7	24·1	59
Untreated	44·4	23·4	88
Soaked in cold water for—			
1 hour dry heat at 140 degrees	41·7	24·1	127
30 minutes 1 hour dry heat 140 degrees	45·6	25·1	108
1 hour 1 hour dry heat 160 degrees	39·8	24·4	84
1 hour 1 hour dry heat 140 degrees	39·6	25·9	63
30 minutes 1 hour dry heat 160 degrees	42·7	25·7	82
30 minutes 2 hours dry heat 140 degrees	44·3	22·7	91

Rose Diseases and Their Control

(Continued from page 496, Vol. XXVIII.)

By B. J. Grieve, M.Sc. (National Rose Society's Research Scholar; Fred Knight and Wyselaskie Scholar).

V.—ROSE RUST.

ROSE Rust occurs on both wild and cultivated roses, and may, under conditions favorable to the fungus, be a very destructive disease.

Scribner[15] states that Hybrid Perpetual roses are badly affected, while Tea roses are immune to the disease. Eriksson[5] considers that Standard roses are most susceptible; the Tea roses less so; while climbing and Polyantha roses are practically immune to the disease. The Sweet Briar (*Rosa rubiginosa*) is very susceptible, and Rose Rust is also very common on *Rosa canina, R. acicularis, R. alba, R. blanda, R. damascena, R. gallica,* and *R. multifida.*

History and Distribution.

Rose Rust has been known to rose-growers and botanists for well over a century, being first described in 1790.

Rose Rust is common in Europe, having been recorded for Italy, Austria, Switzerland, Germany, Portugal, Belgium, France, and Britain by the year 1888[13]. It is also common in the United States, Canada, Eastern Asia, South Africa, Syria, Persia, Natal, Jamaica, India, and Australia. Rose Rust as it occurs in Australia was described by McAlpine[10] in 1902. It had been recorded in Victoria in 1898, in South Australia in 1899, and in Tasmania in 1902. It was first recorded for New South Wales in 1912. Recently it has been reported from Morocco (1921), Mexico (1921), and Argentine (1922).

Fig 9.—Rose Rust [*Phragmidium Mucronatum* (Pers.) (Schlecht)].

1. Rose branch and leaves with aecidial stage of fungus.
2. Rose leaf with teleutospores.
3. Teleutospores.
4. Uredospores. (After Massee.)

Economic Importance.

Rose Rust when prevalent in a district may seriously affect rose-growing. Scribner[15] speaks of it as being economically serious in the United States, while McAlpine[10], in Australia, says, ". . . it has become a pest in the nurseries, causing considerable damage to Dog rose stocks. Seedlings are attacked very severely in a favorable season and killed out-

right." Eriksson[5], and other Continental pathologists, also consider it to be a very destructive rose disease.

Symptoms.

The disease first makes its appearance on the leaves and young stems in the spring time, or in early summer. The under sides of the leaves, stems, and calyces show orange to lemon yellow coloured spots, which increase in size as the season advances. This is the aecidiospore or caeoma stage of the fungus.

On the leaf veins these pustules extend up to 5*m* in length, and on the stems up to 10μ. They often form large hypertrophies and curvatures on the affected parts. The fungus finally ruptures the epidermis on the under surface of the leaves, giving the pustule-like appearance. Scribner[15] states that the action of the parasite often incites an excess cell development in the tissues of the host, in consequence of which the shoots are found more or less bent away from the point of attack.

In mid-summer, the orange yellow spots on the leaves have to all appearances been replaced by brick-red spots, representing the uredo stage of the fungus. Later in the season, the same leaves show minute black hair-like tufts on the under-surface, indicating the presence of teleutospores. The affected leaves turn yellow, and fall prematurely to the ground. Blossoms develop badly or not at all. The disease is most serious when the perennial mycelium is established in the stem. The bushes are greatly weakened, and may die back.

Etiology of the Disease.

Rose Rust is caused by the fungus *Phragmidium mucronatum* (Pers.) Schlecht = *P. subcorticium* (Wint.) Schlecht.

The reasons for the adoption of the name *P. mucronatum* are set out in Ramsbottom's[12] paper on "Notes on the Nomenclature of some Rusts," as follows:—"An amazing mass of synonymy meets one when considering what names should be applied to the fungus, the teleutospores of which seem to have been first described by Tode[17] in 1790 as a variety of *Ascophora disciflora* (*asolida*).

Tode's name cannot hold, as it antedates Persoon's[11] Synopsis. The name *Phragmidium disciflorum,* which has been proposed by James[9], and accepted by several authors, should therefore be dropped. The uredospores of the species (*asolida*) were given the name *Lycoperdon subcorticinum* in Hoppe's Botanisches Taschenbuch[8], in 1793, and their host plant as "Rosensbranches." This name (*Phragmidium subcorticium* Wint., *P. subcorticatum* Plowr.) is invalid, in that it was given to an imperfect stage, and is also prior to Persoon's Synopsis. In the synopsis, p. 230, Persoon[11] has a species *Puccinia mucronata,* which has apparently the same limits as *Ascophora disciflora.* A sub-species was named *Puccinia Rosae,* on *R. centifolia* and *R. alba.*

The specific name *mucronata* was taken up by Fries[6] for Persoon's sub-species *Puccinia Rosae,* which latter name has been used as a specific name by Schumacher, and also by De Candolle[3]. It would seem that Fries's old specific name, so familiar in England, should be adopted. The combination *Phragmidium mucronatum* was made by Schlechtendahl[14] in 1824."

Morphology.

The pustules in the early stage are made up of an immense number of globose or angular bodies arranged in compact vertical rows or chains. The formation of these bodies begins at a point some distance beneath the cuticle, and it is by their growth that the latter is finally ruptured.

This stage of development is the aecidio or caeoma stage of the parasite, and the angular to rounded bodies are the aecidiospores. Aecidiospores verrucose, orange yellow, 24 — 25 × 18 — 21μ. They are surrounded in the aecidium by club-shaped paraphyses.

Uredo Stage.—Uredospores ellipsoid or ovate, echinulate, orange yellow, 21 — 28 × 14 — 20μ. The uredospores are borne on short pedicels, and are surrounded by paraphyses in a cup-shaped area.

Teleutospore Stage.—Teleutospores are dark-coloured, cylindrical bodies, ellipsoid, usually six to eight cells, with a pointed papilla, 65 — 120 × 30 — 40μ ; pedicels persistent, as long as the spore, swollen at the base, hyaline.

Life History.

Aecidiospores develop first in the season. They show in small caeomata on the under-surface of the leaves, and arise through infection by sporidia; or as long irregular caeomata formed from a perennial mycelium in the stem. Eriksson[5] states that the perennial mycelium may repeat aecidiospore production in the stems over three consecutive years, no uredo or teleutospores being produced. He also

states that inoculation experiments with young and old aecidiospores gave negative results. Aecidiospores in the process of germination send out slender germ tubes, which, if properly placed, penetrate the tissues of plants attacked.

Uredospores develop later as the second stage in the life cycle of the fungus. These spores also germinate by means of germ tubes, and it is this type of spore which spreads the disease in space, giving rise to an epidemic of Rose Rust.

The teleutospore stage, or the over-wintering spore stage of the fungus, develops last in the cycle.

The teleutospore method is the most common method of over-wintering of the fungus on roses.

The perennial mycelium method is only known for certain roses, e.g. *Rosa rubrifolia.*

Teleutospores germinate by sending out somewhat thickened tubes (generally one from each cell), which, after attaining a length several times that of a teleutospore, produce several minute globose bodies on short and slender stalks. These bodies, called sporidia, are easily blown from place to place by air currents, and when they fall on moist rose leaves, they germinate and produce a new infection. They give rise to the aecidiospore stage.

Control.

For this disease there are two methods by which the fungus may over-winter, namely, perennial mycelium and teleutospores. Stems known to be bearing the perennial mycelium should be cut out and burnt. Fallen rose leaves which bear teleutospores should be swept up and burnt. Spray in winter-time with Bordeaux mixture.

Rose Rust Bibliography.

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THE ROSE PHRAGMIDIUM.

Phragmidium speciosum Fries.

Besides the well-known Rose Rust caused by *Phragmidium mucronatum* (Pers.) Schlecht, there are numerous less important rust diseases of the rose caused by other species of Phragmidium.

The one to be described here is fairly serious in the United States and on the Continent of Europe.

Symptoms.

The fungus causing this rust appears mainly on the stems; only rarely does it occur on the leaves. The disease is characterized by the presence of black irregular masses on the stem. These black masses represent the fruiting bodies of the fungus. Eventually the stem may become girdled and the plant dies. The mycelium of the parasite does not penetrate the woody tissue of the stem, but its growth appears to be confined to the inner bark and cambium layer, the life of which it destroys.

The mycelium of the fungus remains in the affected stems, and allows of the appearance of the disease in the following year.

Etiology.

Cause of the disease, *Phragmidium speciosum,* Fries, = (*Earlea speciosa* (Fr.) Arth.).

The fungus causing the above disease was first described by Schweinitz, an American botanist, in 1822, under the name of *Seiridium marginatum.* Later it was placed in the genus Phragmidium by Fries, who named it *Phragmidium speciosum.*

Arthur, in 1909, considered that it should be separated as *Earlea speciosa* on account of its non-gelatinous teleutospore pedicel, its large compact caulicolous telia, and the absence of uredinia.

Morphology.

Teleutospores brown in colour, five to seven celled, with a somewhat abruptly-pointed colourless apex, 30μ in diameter $\times$ 70-100μ in length. The pedicel is several times the

length of the spore, and is slightly tinted at the upper part, colourless below, and nearly uniform in diameter throughout.

Control.

Control measures as for Rose Rust will keep this disease in check.

The Rose Phragmidium—Bibliography.

1. Arthur, J. C., Torreya, 9, pp. 21-28, 1909.
2. Burrell, —, Paras Fgi., Illinois, p. 206, 1889.
3. Fries, E., Syst. Myc. III., p. 496 (Aregma).
4. Martin, G. H., and Jenkins, A. E., Plt. Dis. Reporter Prelim. List of Fungi and Rose Dis. in U.S.A., Supp. 63, p. 366, 1928.
5. Saccardo, P. A., Syll. 7, p. 744.
6. Scribner, F. L., U.S. Dep. Ag. Rept., 1888, p. 372.

Besides the preceding rust diseases of the rose there are others of less importance caused by other species of Phragmidium.

Phragmidium tuberculatum[2], Müll., is found on the leaves of *Rosa cinnamomea, R. canina, R. rubrifolia,* and others, on the Continent of Europe.

It forms purple caeoma spots on the upper surfaces of the leaves, and produces uredospores on the under surface of the leaves. *P. fusiforme*[2 & 3], Schröt., forms caeoma pustules on all green plant parts of *Rosa alpina,* and uredo and teleuto pustules on the lower surfaces of the leaves. This species occurs on roses in Europe.

Arthur[1], in the United States, recognizes nine forms on roses, as follows:—

Phragmidium montivagum, Arth. (*P. disciflorum* (Tode, James)) = *P. mucronatum* (Pers.) Schlecht, *P. americanum* Diet., *P. Rosae-setigerae* Diet., *P. Rosae-californicae* Diet., *P. Rosae-arkansanae* Diet., (*P. subcorticinum* (Schr.) (Wint.) = *P. mucronatum* (Pers.) Schlecht, *P. occidentale,* Arth., *P. Rosae-acicularis* Siro.

They do not cause serious rose diseases, and are therefore not considered in any detail.

Bibliography.

1. Arthur, J. C., North Amer. Flora 7, 3, 1912, pp. 166-172.
2. Eriksson, J., Die Pilzkrankheiten der Garten und Parkgewachse, p. 160, 1928. Franckh'sche Verlag. Stuttgart.
3. Grove, W. B., Brit. Rust, Fungi. Camb. Univ. Press, p. 294, 1913.

Victorian Meat in London.

In his November report on the Smithfield Market the Commonwealth Veterinary Officer in London states that, for once, Australian lambs have been quoted for a noticeable period at the head of the imported list. This year in most lines, and particularly amongst the "Arch" Ballarat lambs, there have been carcasses which would not have been out of place in almost any line of primest lambs, and it is undoubtedly due to the Ballarat lambs that the quotations have figured as high as they have done. Mr. Allen adds:—"Increased quantities of Australian pork have been seen, and without exception, so far as I am aware, have been entirely satisfactory, though prices have fallen away as follows:—

Australian.	New Zealand.	Argentine.
5/8 – 6/0	5/4 – 6/2	5/2 – 5/8
5/4 – 5/10	5/2 – 6/2	4/4 – 5/4
5/0 – 5/6	5/0 – 5/10	4/4 – 5/2
5/0 – 5/4	4/8 – 5/10	4/4 – 5/4

It will be seen that at least the prices compare favorably with New Zealand pigs, the margin in favour of New Zealand porkers being probably due to the fact that the Australian porkers include a considerably greater range of weights. I have yet to hear a complaint regarding the quality of Australian pigs, though unfortunately, for reasons which at present cannot be altered, the same cannot be said regarding dressing. Recently some Australian pork has arrived single-wrapped in stockinette of ordinary weight and mesh, and, as far as I can ascertain, this method has proved quite satisfactory. It is not unusual to find abrasions on carcasses, their extra weight probably increasing their liability, but it is doubtful if double wrapping would exercise any material effect in minimizing the abrasions I refer to, so that it is reasonable to conclude that pigs will stand single wrapping better than any other frozen carcasses or quarters."

Standard Herd Records

For Quarter ended 31st December, 1930

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 295, of which 198 qualify for the certificate.

The amount of butter fat required for qualification varies according to the age of the animal (up to 5 years at time of calving), the standards being as follow :—

Junior 2 year old (under 2½ years at time of calving) .. .. .. 200 lb. butter fat.
Senior 2 year old (between 2½ and 3 years at time of calving) .. .. 225 lb. butter fat.
Junior 3 year old (between 3 and 3½ years at time of calving) .. .. 250 lb. butter fat.
Senior 3 year old (between 3½ and 4 years at time of calving) .. .. 275 lb. butter fat.
Junior 4 year old (between 4 and 4½ years at time of calving) .. .. 300 lb. butter fat.
Senior 4 year old (between 4½ and 5 years at time of calving) .. .. 325 lb. butter fat.
Mature cow 5 years and over .. .. 350 lb. butter fat.

(Except where otherwise stated, the period of Test was 273 days.)

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
N. B. Alston, Romsey (Jersey)	1	1	Rosyth Meadow Sweet	26379	27.1.30	19	5,382	4·86	261·47	200	Jr. 2	231
J. Anderson, junr., Lyndhurst (Jersey)	2	2	King's Vale Linda 75th	25717	6.1.30	17½	5,259	5·30	278·62	200	Jr. 2	
			King's Vale Lady Monica 24th	25716	1.2.30	17	5,307	4·83	256·42	200	Jr. 2	
Archibald and Sons, Sale (Jersey)	5	4	Glenallan Blue Bell ..	25226	2.1.30	27	7,724	4·01	309·39	200	Jr. 2	
			Glenallan Royal's Primrose	25227	7.1.30	17	4,901	5·11	250·41	200	Jr. 2	
			Studleigh's Empire ..	19878	8.1.30	18	4,434	6·22	275·63	325	Sr. 4	209, 253, 288
			Gnarbrook Myra ..	24420	30.1.30	20	6,825	5·54	378·29	275	Sr. 3	
			Glenallan Tulip's Result	25723	17.2.30	16	6,270	4·83	302·66	200	Jr. 2	
Mrs. L. R. Archibald and Sons, Tongala East (Jersey)	2	2	Mayfield Park Lady Betty	24216	24.3.30	18½	5,741	5·87	336·88	250	Jr. 3	243
			Mayfield Park Lady Monica 4th	25726	25.3.30	16	4,998	5·97	298·20	200	Jr. 2	
W. K. Atkinson, Swan Hill (Milking Shorthorn)	4	4	Princess of Willow Park	12510	7.2.30	27	9,848	3·87	380·66	350	Mature	256, 363, 370, 346, 407, 410, 397, 382
			Camelia of Willow Park	13206	10.2.30	28½	14,508	4·24	614·73	350	Mature	384, 441, 515, 539
			Blush of Willow Park..	11069	10.2.30	38	12,392	4·01	497·44	350	Mature	320, 368, 478, 494, 565, 515, 398, 410
			Willow Park Camelia 2nd	Vol. 1	1.3.30	41½	11,051	3·86	426·58	300	Jr. 4	288, 376
A. P. Bailey, Catani (Jersey)	2	2	Springhurst Miljee ..	26349	24.3.30	14½	4,248	5·81	246·94	200	Jr. 2	
			Springhurst Whin ..	Vol. 17	28.3.30	12½	4,289	6·46	277·23	200	Jr. 2	
Ballarat Orphanage, Ballarat (Jersey)	2	1	Flower of Paradise ..	11737	8.1.30	19½	5,474	5·59	306·19	350	Mature	238, 251
			Tavistock Mystery ..	23052	6.2.30	24½	7,327	5·68	416·17	300	Jr. 4	361

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
G. H. Belfield, Coleraine (Jersey)	1	1	Wootong Vale Golden Buttercup	25756	25.2.30	16	8,261	4·78	394·91	250	Jr. 3	351
F. Bidgood, Wodonga (Jersey)	4	4	Staghorn Masterlark's Laburnum	22979	7.3.30	30½	8,802	5·48	482·17	300	Jr. 4	475
			Staghorn Master's Fancy	22982	15.3.30	20½	6,377	5·99	381·82	325	Sr. 4	347
			Beauty of Staghorn ..	11251	17.3.30	26½	8,487	5·68	481·74	350	Mature	223, 289, 334, 367, 483, 514
			Staghorn Master's Marigold*	Vol. 17	27.3.30	14	3,600	6·42	231·03	225	Sr. 2	
Mrs. A. J. Black, Noorat (Jersey)	1	1	Noorat Geranium ..	25269	11.2.30	16	5,081	5·67	287·95	200	Jr. 2	
I. S. Black, Noorat Home farm (Ayrshire)	3	3	Ben Kell Poppy 3rd..	17318	24.2.30	17	5,724	4·80	274·75	200	Jr. 2	
			Ben Kell Pandora† ..	15732	15.3.30	4	7,185	3·81	273·74	250	Jr. 3	296
			Ben Kell Mavis ..	15419	27.3.30	16½	8,571	4·42	378·42	325	Sr. 4	310
A. A. Broad, Sutton Grange (Jersey)	1	1	Grangelea Roseleaf ..	24276	29.12.29	21½	5,834	4·71	275·06	250	Jr. 3	301
D. Cameron and Sons, Valencia Creek (Jersey)	1	1	Werribee Wyandotte Cream	12244	27.3.30	21½	7,548	5·86	442·29	350	Mature	334, 475 559, 558, 408, 442
W. C. Cayley, Werribee (Ayrshire)	1	1	Joy Queen of Riversdale	13304	1.1.30	22	9,386	4·22	396·38	350	Mature	414, 514, 603
J. E. Chadderton, Hamilton (Jersey)	2	2	Thora 2nd of Jersey Meadows	17493	2.2.30	20½	6,437	5·60	360·68	350	Mature	275, 352
			Duchess 2nd of Glenleigh	15463	12.3.30	28	8,322	6·57	546·80	350	Mature	348, 441
Captain J. P. Chirnside, Oakleigh (Jersey)	1	1	Werribee Island Fancy	13202	2.1.30	18	5,633	6·22	350·22	350	Mature	434, 504, 414
R. M. Chirnside, Whittlesea (Jersey)	4	4	Austral Valley Isobel	23283	28.12.29	19½	7,230	5·74	414·83	275	Sr. 3	352
			Austral Valley Lady Melva	23031	16.1.30	15½	5,343	6·51	347·76	250	Jr. 3	305
			Brucevale Fancy Starbright 2nd	25802	11.2.30	14	4,122	7·50	309·11	250	Jr. 3	338
			Brucevale Fancy Madeira 2nd	25801	15.2.30	18	5,227	6·85	358·21	225	Sr. 2	
R. C. Clymo, Bamawm (Ayrshire)	2	1	Prudence of Gleneira ..	8867	27.2.30	20	7,422	4·30	319·15	350	Mature	282, 283, 252, 393
			Omakau Vale Alice ..	21979	6.3.30	18	5,301	3.94	208·78	200	Jr. 2	
J. Clyne, Upper Maffra West (Jersey)	4	4	Jersey Vale Jonquil ..	24540	28.12.29	16½	5,315	5·07	269·69	225	Sr. 2	
			Fancy 2nd of Swansea	21188	8.1.30	16½	6,077	5·82	353·78	300	Jr. 4	337
			Paisley Peach ..	25326	21.1.30	18	5,233	4.86	254.28	225	Sr. 2	190
			Jersey Vale Flower ..	25312	11.2.30	22½	7,175	4·82	345·72	250	Jr. 3	292
W. J. Cockbill, Bacchus Marsh (Ayrshire)	1	1	Fulham Verose ..	13339	18.2.30	34½	12,041	4.04	485·89	350	Mature	396, 272, 167, 306

* Died before completion of term. In Test only 210 days. † In Test only 240 days.

Standard Herd Records—*continued.*

Owner.	No. completed Test.	No. certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
W. J. Cockbill, Rockbank (Ayrshire)	2	..	Fulham Valetta ..	10919	22.2.30	12	6,582	4·47	294·19	350	Mature	344, 345, 318
			Fulham Laughter* ..	16057	27.3.30	4	2,280	4·10	93·43	250	Jr. 3	190
W. and J. Cockbill, Tongala (Ayrshire)	3	..	Fulham Veronica ..	14648	15.2.30	4	4,955	4·35	215·35	300	Jr. 4	158
			Good Luck of Glenord	6253	25.2.30	9½	6,993	3·91	273·72	350	Mature	368, 338, 341, 286, 339
			Oakbank Rosetime ..	15316	5.3.30	4	4,733	3·96	187·63	350	Mature	196
J. Cook, Toora .. (Jersey)	1	..	Pretty Lady of Whare Koa	14143	14.2.30	25	6,377	5·46	348·00	350	Mature	345, 337, 419, 409
T. A. P. Coombes, Tongala (Jersey)	1	..	White Socks of the Valley	21207	8.2.30	15½	5,648	5·48	309·73	350	Mature	271
H. Cowling, Mornington (Jersey)	1	1	Edmonton Rarity 3rd	25817	14.3.30	20	5,846	5·82	340·10	200	Jr. 2	
C. Coughlin, Yannathan (Jersey)	2	2	Karowara Quicksilver	Vol. 17	2.2.30	7½	5,180	5·87	304·21	250	Jr. 3	238
			Aveley Valda's Petal ..	26314	26.2.30	18½	4,509	5·71	257·59	225	Sr. 2	188
A. Cox, Mt. Scobie, Kyabram (Jersey)	3	3	Tavistock Faithful ..	23055	6.1.30	24	8,538	5·19	443·25	300	Jr. 4	
			Tavistock Muriel ..	25818	25.1.30	16½	5,678	5·71	324·42	250	Jr. 3	244
			Audrey's Duchess of Tavistock	21208	27.1.30	16	6,691	6·00	401·14	350	Mature	287
E. E. Davis, Bass .. (Jersey)	5	3	Blackwood Grove Buttercup†	25339	16.1.29	4	2,100	5·28	110·98	200	Jr. 2	
			Blackwood Grove Phyllis	25341	4.3.30	12	3,713	5·79	214·85	200	Jr. 2	
			Bonnie Brae Mountain Princess	Vol. 17	16.3.30	10	5,689	5·03	286·42	350	Mature	
			Blackwood Grove Daphne	23120	16.3.30	21	7,343	4·84	355·73	325	Sr. 4	277, 291
			Bonnie Brae Serviette	25343	18.3.30	23	6,441	6·10	392·74	300	Jr. 4	452
E. Day, Penshurst (Jersey)	1	1	View Point Duchess ..	24325	14.3.30	20	6,189	5·80	358·93	275	Sr. 3	314
J. Dee, Clyde North (Jersey)	2	1	Dainty of Clyde Vale ..	21245	1.1.30	13	5,232	5·21	272·32	300	Jr. 4	286
			Cora 3rd of Elouera ..	15474	15.3.30	26½	8,481	4·97	421·37	350	Mature	420
Department of Agriculture, Burnley Horticultural Gardens (Jersey)	1	1	Victoria Charm ..	..	21.3.30	16½	4,935	6·74	332·68	200	Jr. 2	
Department of Agriculture Research Farm, Werribee (Friesian)	1	1	Victoria Carina ..	2065	1.1.30	29	12,479	3·40	424·55	350	Mature	335, 349, 391
Department of Agriculture Research Farm, Werribee (Red Poll)	4	3	Victoria Blue Ribbon..	1149A	5.1.30	23½	8,265	4·82	398·30	350	Mature	248, 359, 405
			Victoria Euphrates ..	716A	8.2.30	17	10,930	3·73	407·37	350	Mature	247, 326, 394
			Victoria Distant View..	1152A	10.2.30	20	7,639	4·28	326·92	350	Mature	322, 385, 401
			Victoria Peace ..	..	28.2.30	17	6,393	4·83	309·04	200	Jr. 2	

* In Test only 180 days. † In Test only 210 days.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
J. J. Desmond, Rochester (Jersey)	1	1	Preston Mayday ..	25356	4.1.30	26½	7,638	5·52	421·64	250	Jr. 3	312
Dookie Agricultural College (Ayrshire)	1	1	Dookie Ada ..	17773	30.1.30	18	8,165	3·82	312·01	300	Jr. 4	336
P. J. Ducat, Ardmona (Jersey)	1	1	Airlie Beauty 2nd ..	25846	1.3.30	17½	6,432	4·87	313·21	275	Sr. 3	133, 257
S. N. Earle, Merricks (Jersey)	2	..	Goldfield Tragedy 5th	Vol. 17	11.1.30	20	5,961	4·99	297·43	300	Jr. 4	249
			Benguella Hope 2nd ..	25858	25.1.30	N.O.C.	2,319	5·28	122·46	200	Jr. 2	
T. J. Edwards, Myrtlebank (Jersey)	3	2	Rockburn Trissie ..	Vol. 17	11.1.30	18	5,525	4·78	264·24	200	Jr. 2	
			Werribee Islands Sultana	21161	9.2.30	13	4,281	5·71	244·49	300	Jr. 4	230, 295
			Sunny Brae Morocco ..	25363	1.3.30	19	5,752	5·74	330·40	200	Jr. 2	
A. J. Eldridge, Noorat (Friesian)	5	4	Burnbank Lady Patch	2696	9.3.30	43½	10,811	3·86	416·83	300	Jr. 4	406, 362
			St. Alban's Lily's Sylvia	2595	12.3.30	25½	10,316	4·09	421·97	300	Jr. 4	329, 369
			Springvale Lorna Patch	3219	16.3.30	46	10,983	3·41	374·18	200	Jr. 2	
			St. Alban's Cordyline Inka	2289	23.3.30	44½	12,689	3·50	444·40	350	Mature	316, 363, 471
			Kerami Spring Flower	2809	28.3.30	24	7,947	3·15	249·95	250	Jr. 3	297
Elliott and Farr, Wimba (Jersey)	2	1	Molly 23rd of Banyule	21432	12.3.30	19	5,071	4·83	244·68	250	Jr. 3	283
			Banyule Bonaire ..	24453	18.3.30	18	5,079	4·56	231·52	200	Jr. 2	
A. E. Ellis, Archie's Creek (Jersey)	1	1	Blackwood Grove Lady Skim	Vol. 17	9.3.30	14	4,646	5·17	240·41	225	Sr. 2	
A. E. Enders, Stanhope (Friesian)	1	1	Burnbank Fraulein Patch*	3029	28.12.29	4	11,430	3·94	450·61	250	Jr. 3	460
N. H. Enders, Stanhope (Jersey)	3	3	The Wattles Tulip ..	25873	20.2.30	11½	5,814	5·89	342·48	225	Sr. 2	341
			The Wattles Lizzie Birt	23124	23.2.30	28½	9,255	5·47	506·16	300	Jr. 4	286, 509
			Myra of the Wattles ..	12917	4.3.30	31	12,699	4·99	633·24	350	Mature	592, 619
A. Evans, Heywood (Jersey)	1	..	Boronia Farm May* ..	23129	8.3.30	N.O.C.	3,390	5·35	181·38	225	Sr. 2	236
Fairchild and Clutterbuck, Tinamba (Jersey)	1	1	Somerville Duchess ..	Vol. 17	21.1.30	25	7,948	5·27	419·02	200	Jr. 2	
A. Fisken, Yendon .. (Milking Shorthorn)	3	..	Poplar Vale Princess 193rd*	Vol. 1	1.1.30	N.O.C.	4,170	4·11	171·44	250	Jr. 3	
			Poplar Vale Princess 194th	Vol. 1	7.2.30	13½	5,045	3·96	199·59	250	Jr. 3	
			Morven Duchess 43rd..	Vol. 1	4.3.30	24	5,937	3·53	209·56	250	Jr. 3	
A. Fixter, Boisdale, (Guernsey)	1	1	Fernlea Daphne ..	..	3.1.30	16½	4,991	5·94	296·36	200	Jr. 2	

* In Test for 240 days only.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
W. A. Fixter and Son, Boisdale (Jersey)	1	..	Queenie of Riversdale	12922	11.1.30	9½	6,180	4·77	294·72	350	Mature	246, 325, 367, 379
Foster Bros., Boisdale (Jersey)	4	4	Boisdale Brunette ..	25374	3.1.30	15½	4,454	5·78	257·48	200	Jr.2	
			King's Vale Canary 24th	Vol. 17	11.1.30	22½	5,921	5·12	302·93	200	Jr.2	
			Jerseyholm Sparkle 11th	23146	15.1.30	14	6,080	6·45	392·37	250	Jr.3	398
			Brunette 18th of King's Vale	16581	15.3.30	18½	6,378	6·15	391·95	350	Mature	256, 348, 405
G. A. Fraser, Addington (Ayrshire)	2	2	Craigielea Sylvia ..	17686	21.1.30	N.o.c.	7,898	4·12	325·67	200	Jr.2	
			Craigielea Flora ..	17683	15.3.30	24	8,228	3·96	325·99	225	Sr.2	
Mrs. E. M. Gange, Werribee (Ayrshire)	5	2	Sunnyside Blazer's Beatie	16753	12.1.30	12½	6,211	3·85	239·34	325	Sr.4	
			Roseleigh Ida ..	16579	26.1.30	17	6,426	4·14	266·02	275	Sr.3	231
			Oakbank Felicity ..	18732	2.3.30	10½	7,083	3·38	239·35	325	Sr.4	
			Roseleigh Doris ..	12104	9.3.30	21	8,576	4·33	371·04	250	Jr.3	
			Roseleigh Azelia ..	16575	10.3.30	27½	9,610	4·37	420·18	325	Sr.4	253
Mrs. M. S. Gardner, Nilma (Jersey)	1	..	Boorene Chief's Pariel	Vol. 17	26.3.30	12	5,909	4·93	291·57	350	Mature	
R. G. Gay, North Devon (Jersey)	3	3	Buttercup of Elm Grove	21303	13.2.30	33	7,847	5·35	419·76	325	Sr.4	450
			Hill Crest Charmaine ..	25996	19.2.30	17	4,179	5·11	213·42	200	Jr.2	
			Elm Grove Jessie Fowler	25900	23.3.30	20½	5,657	4·85	274·24	200	Jr.2	
Gibson Bros., Trafalgar (Jersey)	5	5	Leathorne Pansy 2nd..	Vol. 17	2.1.30	14	3,905	5·64	220·11	200	Jr.2	
			Leathorne Pearline ..	24369	8.2.30	17	5,597	6·39	357·58	300	Jr.4	323
			Eminent Minnie Ha-Ha 6th of Clarendon Eyre	21306	10.2.30	33	7,752	5·40	418·43	350	Mature	352, 467
			Attraction of Leathorne	16271	18.2.30	23½	6,869	5·36	368·32	350	Mature	276, 350, 369
			Leathorne Buttercup 3rd	23162	21.2.30	13½	4,679	6·01	281·26	275	Sr.3	288
A. W. Gorman, Alexandra (Ayrshire)	1	1	Catheart Linette ..	19718	1.3.30	15½	5,858	4·42	259·21	200	Jr.2	
J. E. Handbury and Sons, Toora (Jersey)	1	1	Tooravale Noreen ..	23191	15.2.30	14½	4,275	6·85	292·69	250	Jr.3	290
D. C. Harker, Caldermeade (Ayrshire)	2	..	Thirlmere Sparkle† ..	16846	11.2.30	4	2,910	4·70	136·63	275	Sr.3	221
			Sunbeam of Thirlmere	14897	10.3.30	17	5,613	4·49	252·16	300	Jr.4	216
W. T. Harker, Caldermeade (Ayrshire)	1	..	Coulcraggie Dimple 2nd‡	15904	24.1.30	4	4,437	4·23	187·72	300	Jr.4	
C. W. Harris, Merino (Jersey)	2	..	Castlemaddie Silver Queen	23303	1.3.30	14½	4,124	5·39	222·13	275	Sr.3	221
			Velveteen of Clover Flat	19927	21.3.30	17½	5,831	5·13	299·38	350	Mature	263, 268, 338

† In Test only 180 days. ‡ In Test only 259 days.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
F. Harrison, Frankston (Jersey)	1	..	Walbundry Beta ..	23201	9.2.30	11½	3,527	6·18	218·01	300	Jr. 4	204
T. Harvey, Boisdale (Jersey)	4	4	Empress 9th of Jerseyholm	21328	15.2.30	13½	5,341	6·69	357·11	300	Jr. 4	329, 406
			Empress 3rd of Jerseyholm	10255	1.3.30	21½	7,313	5·25	383·59	350	Mature	396, 391, 478, 497, 474, 442
			Jerseyholm Empress 14th	25399	18.3.30	16½	4,893	5·67	277·33	200	Jr. 2	
			Empress 12th of Jerseyholm	25397	18.3.30	18	5,463	5·49	300·09	225	Sr. 2	
H. R. Heard, Derrinallum (Ayrshire)	3	2	Craigmore Leila ..	17687	26.3.30	15	6,930	3·66	253·98	200	Jr. 2	237
			Annie Laurie of Sparrovale	9091	28.3.30	23½	8,756	3·57	312·83	350	Mature	254, 308, 407
			Craigmore Sylvie ..	15908	29.3.30	13	7,479	4·06	303·72	300	Jr. 4	244, 244
W. Henderson, Grasmere Home Farm (Ayrshire)	1	1	Carracoorte Bonny 2nd	21129	16.3.30	17½	5,895	4·81	283·78	200	Jr. 2	
L. J. Herd, Heidelberg (Jersey)	1	1	Banyule Vivace ..	24475	6.2.30	16	4,971	4·98	247·37	200	Jr. 2	
Mrs. E Hitchens, Werribee (Jersey)	3	2	Laane Flirt	23207	17.1.30	16	6,384	5·12	327·08	325	Sr. 4	312
			Boori Classic Flash Flapper	26425	6.2.30	N.O.C.	3,225	6·30	203·10	200	Jr. 2	
E. H. Howlett, Morwell (Jersey)	2	..	Latrobe Lily 6th ..	25417	20.1.30	13½	3,998	4·80	191·81	200	Jr. 2	
			Latrobe Molly 3rd ..	25421	2.2.30	9	2,457	5·30	130·33	200	Jr. 2	
A. Hubbard, Yarra Glen (Ayrshire)	3	..	Alison of Sunnyside ..	14283	13.1.30	15½	5,852	4·09	239·39	350	Mature	
			Sunnyside Cherrie 2nd	16761	14.1.30	17½	6,381	3·82	243·96	300	Jr. 4	
			Sunnyside Janey ..	16780	9.2.30	16	5,430	3.96	215.25	300	Jr. 4	
W. H. Hurry, Koonwarra (Jersey)	1	1	Kooreena Lulu 2nd ..	25950	30.12.29	14½	4,850	6·04	293·18	200	Jr. 2	
J. Hutchinson and Sons, Somerville (Jersey)	4	4	Somerville Babs 2nd ..	23225	20.1.30	32	8,703	4·70	409·10	300	Jr. 4	443
			Heroine of Somerville..	18758	22.1.30	37½	9,858	4·22	416·15	350	Mature	307, 416
			Somerville Northern Princess	23226	11.2.30	32	8,568	4·93	422·65	300	Jr. 4	413
			Somerville Daphne 2nd	25956	19.2.30	30½	8,267	5·30	438·34	275	Sr. 3	432
A. B. Ingram, Powelltown (Illawarra Milking Shorthorn)	1	..	Elsie 7th of Glenburn	..	12.2.30	17	5,412	3·88	209·84	225	Sr. 2	
L. W. Jakobi, Catani (Jersey)	1	1	Springhurst Tamarisk	24568	20.1.30	20	6,011	5·34	321·24	225	Sr. 2	333
G. A. Kent, Archie's Creek (Ayrshire)	1	1	Woolamai Donor ..	19304	28.3.30	14½	6,663	3·92	261·51	200	Jr. 2	
A. Lade, Alexandra (Jersey)	3	2	Hythe's Butterfly ..	26002	30.12.29	18½	5,378	4·77	256·55	250	Jr. 3	
			Hythe's Buttercup ..	Vol. 17	24.2.30	16	4,601	4·99	229·43	225	Sr. 2	
			Hythe's Lady Grey ..	Vol. 17	24.2.30	14	3,765	4·96	186·59	225	Sr. 2	

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
O. W. J. Leemon, Archie's Creek (Jersey)	2	..	Karalee Duchess ..	21261	8.1.30	16	5,331	4·82	257·13	350	Mature	228, 253, 313
			Karalee Duchess 2nd*	C.R.	21.3.30	16½	3,405	4·18	142.16	200	Jr.2	
Longerenong College, Dooen (Ayrshire)	1	..	Longerenong Stella ..	16434	25.2.30	13	5,270	4·51	237·77	300	Jr.4	174, 281
Mrs. L. Lowing, Tongala (Jersey)	2	1	Cooel Master's Florrie 2nd	Vol. 17	23.1.30	N.O.C.	7,539	5·25	395·83	225	Sr.2	
			Pansy 2nd of Jersey Vale	21424	1.3.30	N.O.C.	6,005	5·47	328·55	350	Mature	302, 410
C. G. Lyon, Heidelberg (Jersey)	2	2	Banyule Silvermine 48th	24468	10.1.30	20	6,182	4·62	285·45	200	Jr.2	
			Banyule Princess 3rd ..	24463	23.1.30	17½	5,444	5·11	278·31	200	Jr.2	
C. W. W. Macauley Rochester (Jersey)	3	1	Taranah Roseleaf 2nd	Vol. 17	29.12.29	11	4,844	6·07	294·14	200	Jr.2	
			Taranah Carol† ..	Vol. 17	19.1.30	7	2,760	5.52	152·23	200	Jr.2	
			Taranah Royal Rose ..	25548	12.3.30	11½	3,275	6·06	198·34	200	Jr.2	
I. McErvale and Sons, Camperdown (Jersey)	1	1	Cumnock Cherry Fawn	25485	26.3.30	11	3,458	5·80	200·71	200	Jr.2	
G. A. McNabb and Son, Irrewillipe E. (Jersey)	5	5	Staghorn Morocco Primrose	25544	31.1.30	25	7,271	4·69	340·73	250	Jr.3	289
			Maxon Noble's Queen	Vol. 17	22.2.30	15½	4,878	5·18	252·47	200	Jr.2	
			Easter Daisy of Springhurst	21607	25.2.30	25½	8,564	4·83	413·33	325	Sr.4	293, 360
			Boorene Silvermine's Clara	25250	28.2.30	15	6,462	5·48	353·89	325	Sr.4	364
			Alsyke 3rd of Springhurst	16960	14.3.30	18	6,974	5·37	374·35	350	Mature	254, 318, 249, 276
Mesdames McWhae and Sylvester (Guernsey)	1	1	Spurfield Petite ..	1893	13.2.30	21	6,104	4·59	280·37	200	Jr.2	
Maher Bros., Seymour (Ayrshire)	1	..	Satinbird of Gowrie Park	13854	7.1.30	13½	6,724	4·39	295·07	350	Mature	368
A. J. Mapleson, Jindivick (Jersey)	2	2	Hazeldale Rarity 3rd Charm	25554	3.1.30	19	5,976	5·82	347·99	250	Jr.3	336
			Ruby of Hazeldale ..	17472	12.2.30	24½	6,542	5·64	368·93	350	Mature	377, 407, 402
A. R. Marshman, Archie's Creek (Jersey)	1	..	Forgan Bloom ..	Vol. 17	15.3.30	8	3,090	5·56	171·89	200	Jr.2	
R. Masters, Swan Hill (Ayrshire)	1	..	Grand View Anne Maria	21693	1.2.30	8	4,163	3·59	149·29	200	Jr.2	
S. H. Masters, Murraydale (Jersey)	1	1	Rutland Brunette ..	Vol. 17	26.2.30	24	6,464	4·84	312·57	200	Jr.2	
T. Mesley, Dalyston (Jersey)	1	1	Warenda Ragtime 5th	Vol. 17	31.12.29	8½	5,079	5·33	270·93	200	Jr.2	

* In Test only 240 days. † Affected with mastitis. In Test 240 days only.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
E. W. Middleton, Hamilton (Jersey)	1	1	Kyora Bettws-Y-Coed	26085	27.2.30	15½	5,693	5·74	326·99	225	Sr. 2	342
J. Moore and Co., Yarram (Jersey)	3	..	Tooloonook Millieme*	23331	20.2.30	4	2,940	5·46	160·58	300	Jr. 4	
			Tooloonook Beauty 4th	Vol. 17	25.2.30	6½	2,792	5·29	147·77	200	Jr. 2	
			Birthday's Verbena of Bellvue	14619	20.3.30	13¾	5,868	4·71	276·30	350	Mature	
Estate of W. J. Muhlebach, Batesford (Ayrshire)	1	1	Retreat Lorna ..	15108	25.3.30	7½	7,194	4.65	334·66	325	Sr. 4	
E. Nicholls, Springhurst (Jersey)	..	..	Maize Chief's Bessie of Blowering	21538	29.1.30	N.O.C.	2,769	6.20	171.78	325	Sr. 4	287
	4	1	Beckie 2nd of Blowering	18875	2.3.30	12½	4,524	5·50	248·78	350	Mature	299, 313
			Nickel Bar Rose Marie	Vol. 17	10.3.30	13½	3,743	5·37	201·14	200	Jr. 2	
			Topsy 3rd of Blowering	18880	25.3.30	13½	4,686	5·71	267·64	350	Mature	325, 267
T. M. Noble and Son, Maffra (Jersey)	2	2	Music of Brucedale ..	16324	29.1.30	16	6,227	5·68	353·70	350	Mature	338, 392, 361
			Ling-a-Longa Fairy's Handsome Girl	Vol. 17	19.2.30	20	5,636	6·89	388·60	350	Mature	336, 446
K. P. O'Brien, Tennyson (Jersey)	1	1	Belgonia Blossom 6th..	Vol. 17	24.1.30	23	6,141	5·37	329·67	200	Jr. 2	
B. R. O'Meara, Caldermeade (Ayrshire)	2	2	Scotsville Mona ..	20725	12.1.30	25	8,625	4·08	352·10	200	Jr. 2	
			Scotsville Silver ..	20728	13.1.30	21	7,604	4·28	325·53	200	Jr. 2	
Mrs. L. Orchard, Grahamvale (Jersey)	4	..	Laura of Jerseyvale.. ..	24541	21.2.30	9	5,727	4.98	285·25	300	Jr. 4	268
			Pearl of Jerseyvale ..	15581	23.2.30	18½	6,078	4.56	277·19	350	Mature	202, 220, 285, 311
			Freezia of Jerseyvale ..	14226	5.3.30	18	6,417	4·55	291·72	350	Mature	265, 314, 262, 291
			Rose of Jerseyvale ..	9590	28.3.30	13	5,870	4·86	285·09	350	Mature	198, 236, 225, 321, 251, 222, 318
Mrs. A. C. Overend, Sale (Jersey)	6	3	Bon Accord Sally ..	Vol. 17	22.1.30	13	3,418	5·48	187·39	200	Jr. 2	
			Waratta Elvie Bell ..	23504	22.1.30	17	4,928	5·37	264·59	250	Jr. 3	264
			Waratta Emma Bell ..	23505	31.1.30	20	5,677	5·71	324·20	250	Jr. 3	314
			Waratta Esther Bell ..	23506	2.2.30	11	4,510	5·26	237·26	250	Jr. 3	216
			Bon Accord Madam Pompadour	Vol. 17	22.2.30	17	4,191	5·42	227·04	200	Jr. 2	
			Sparkle 9th of Jerseyholm	13358	11.3.30	20	5,327	6·29	335·16	350	Mature	307, 408, 343
I. Padgett, Werribee (Friesian)	1	1	St. Albans Ina Sylvia..	2593	13.3.30	33	18352	3·84	705·01	350	Mature	593
W. Parbury, Wesburn (Jersey)	3	1	Daisy 3rd of Brookfield	15585	5.1.30	20	6,450	5·42	349·41	350	Mature	360, 312
			Golden Leaf 8th of Brookfield	18890	1.3.30	19½	5,660	5.84	330.66	350	Mature	343
			Rosalind 5th of Brookfield	15589	5.3.30	27½	6,906	5·56	384·16	350	Mature	346, 410
J. Pearson, Nereena East (Jersey)	1	1	Warrawee Snowdrop ..	24546	16.3.30	25	7,373	4·95	364·65	275	Sr. 3	349
Pettitt Bros., Geelong (Ayrshire)	1	1	Blinkbrae Beautiful 2nd	15762	28.2.30	9½	6,320	4·51	285·11	250	Jr. 3	260

* In Test 240 days only.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certified.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
J. Phillips, Murraydale (Jersey)	2	1	Peri Empire 3rd ..	26131	20.1.30	15½	4,805	5·79	278·35	250	Jr. 3	205
			Peri Carnation 3rd ..	26130	21.1.30	21	5,193	4·48	232·63	250	Jr. 3	207
J. Plattfuss, Tongala (Friesian)	6	5	Glen Elgin Clarice ..	2453	1.1.30	12½	11,736	4·19	491·52	350	Mature	488, 490
			Greenvale Oakwood Empress	3106	2.1.30	41	7,503	3·57	267·53	250	Jr. 3	257
			Greenvale Rosie Keys	3108	19.1.30	43½	12,977	3·15	408·13	250	Jr. 3	270
			Greenvale Duchess Paxton	2768	20.1.30	20	12,441	3·53	439·69	300	Jr. 4	325, 466
			Greenvale Juno Rose 2nd	1570	25.1.30	35	14,202	3.31	470·44	350	Mature	349, 544, 473
			Burnbank Pictertye Girl	2387	10.3.30	13	7,325	3·58	262·57	350	Mature	267
J. Powell, Camperdown (Jersey)	1	1	Mt. Violet Queenie's Pet	23375	27.3.30	15	5,739	5·59	320·69	275	Sr. 3	320
A. Prout, Leongatha (Jersey)	2	1	Wattle Vale Wild Flower	23380	12.2.30	30½	7,890	5·10	402.45	300	Jr. 4	409
J. D. Read, Springhurst (Jersey)	9	8	Boltonia 4th of Springhurst	21601	9.1.30	11	5,481	5·11	279·86	275	Sr. 3	321
			Springhurst Nerine 2nd	26169	10.3.30	10	4,263	6·36	270·94	200	Jr. 2	
			Springhurst Yarram ..	24570	12.3.30	19½	7,337	6·17	452·87	225	Sr. 2	428
			Springhurst Alsyke 4th	Vol. 17	15.3.30	15½	4,773	6·35	303·06	200	Jr. 2	
			Gladiolus 2nd of Springhurst	18929	15.3.30	21½	7,913	5·78	457·22	350	Mature	401, 487, 445
			Springhurst Tazerim ..	26173	18.3.30	19	5,907	5·20	307·06	200	Jr. 2	
			Springhurst Tulip 6th..	Vol. 17	18.3.30	7	2,964	6·26	185·64	200	Jr. 2	
			Springhurst Azalia 3rd	24561	23.3.30	15½	5,891	6·25	368·36	225	Sr. 2	329
			Springhurst Countess 4th	26165	29.3.30	12½	4,311	6·34	273·46	200	Jr. 2	
W. P. Rogen, Tatura (Jersey)	3	3	Werribee Starbright 10th	21629	3.1.30	30	10,311	5·05	520·79	300	Jr. 4	397
			Kantara's Pride ..	18950	14.1.30	19½	7,728	5·86	453·06	350	Mature	378
			Kantara's Nanette ..	26202	23.2.30	25½	7,971	5·18	413·17	200	Jr. 2	
D. M. Ryan and Sons, Colac (Illawarra Milking Shorthorn)	1	1	Tottie 7th of Glengowrie	..	16.3.30	22	6,756	4·20	283·99	200	Jr. 2	
R. W. Sadler, Noorat (Ayrshire)	1	1	Burnbrae Pendant ..	15792	29.3.30	16½	8,642	3·91	337·70	275	Sr. 3	266
W. A. Sandles, Mount Best, via Toora (Jersey)	1	..	Lady Betsy's Tottie of Franklin Park*	18959	29.12.29	4	4,395	4·86	213·78	325	Sr. 4	251, 317
Salesian College, Sunbury (Ayrshire)	2	1	Rupertswood Rose*	22059	29.12.29	4	4,305	4·54	195·50	350	Mature	195
			Linda of Medburn Grove	8303	27.3.30	28	9,720	3·79	368·57	350	Mature	284, 355, 394, 406, 318, 209, 351, 311
A. H. Schier, Kernot (Ayrshire)	11	4	Oakbank Gwendoline	15243	30.12.29	6	3,828	4·01	153·49	350	Mature	228
			Scotswood Stella ..	20751	13.1.30	10½	4,094	3·83	156.74	200	Jr. 2	
			Scotswood Joybell ..	18918	22.1.30	15½	7,100	4·65	330·14	250	Jr. 3	288
			Scotswood Goldlace 2nd	20735	24.1.30	14½	3,690	4·54	167·67	200	Jr. 2	
			Scotswood Dainty Lass†	20734	4.2.30	4	1,695	4·54	76·95	200	Jr. 2	
			Scotswood Merline‡ ..	15487	9.2.30	4	4,650	4·87	226·32	350	Mature	221, 191, 153, 249, 225
			Scotswood Marion ..	20738	10.2.30	19½	5,137	3·99	204·91	200	Jr. 2	
			Scotswood Beryl 2nd ..	20731	16.2.30	20	5,534	4·12	227·76	200	Jr. 2	
			Scotswood Future 2nd	18915	20.2.30	14½	5,711	4·08	232·82	250	Jr. 3	276
			Scotswood Better Still	15470	24.2.30	7	4,859	3·75	182·04	325	Sr. 4	178, 159, 222,
			Scotswood Primrose 2nd	20747	24·3·30	N.O.C.	5,765	4·13	238·01	200	Jr. 2	

* In Test 210 days only. † In Test 150 days only. ‡ In Test 240 days only.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
H. A. Schier, Rochester (Jersey)	3	2	Preston Rosleaf ..	25596	30.12.29	21	6,952	4·31	299·64	250	Jr. 3	221
			Preston Rosamond ..	25595	4.1.30	25	7,217	4·44	320·49	275	Sr. 3	255
			Jenny Lind 2nd of Taff Vale	17831	22.1.30	13	6,544	5·33	348·76	350	Mature	352, 349, 396
A. J. Schlipalius, Kilmany South (Jersey)	2	2	Fairbank Duchess ..	24596	28.12.29	15½	4,595	6·11	280·54	225	Sr. 2	271
			Fairbank Melba ..	23433	13.1.30	11½	4,683	5·37	251·33	250	Jr. 3	252
T. J. Scott, Rochester (Jersey)	1	1	Fairhope Magnet ..	21398	24.2.30	21	7,488	6·84	512·23	325	Sr. 4	
Dr. S. V. Sewell, Berwick (Friesian)	1	1	Road's End Fabia ..	C.R.	28.3.30	31½	9,411	3·24	304·88	225	Sr. 2	
Dr. S. V. Sewell, Berwick (Guernsey)	1	1	Rosewood Rosy Joan	..	1.1.30	11	3,842	5·38	206·70	200	Jr. 2	
Messrs. Smith and Sons, Woodend (Friesian)	1	1	Bolobek Adelina ..	3005	24.1.30	32	8,358	3·80	317·59	200	Jr. 2	
G. and W. Smith, Fish Creek (Jersey)	1	1	Rydon Petal ..	24606	26.1.30	23½	7,498	6·05	453·29	250	Jr. 3	371
G. Taylor, Caldermeade (Ayrshire)	2	2	Eldorado Queenie* ..	15974	2.2.30	4	6,765	4·05	273·67	250	Jr. 3	352
			Eldorado Snowflake ..	17798	8.2.30	7½	6,594	4·10	270·51	200	Jr. 2	
F. Trevaskis, Tongala (Jersey)	1	1	Model 2nd of Ballara ..	21712	30.12.29	20	9,932	4·86	482·76	275	Sr. 3	293, 395
T. H. Trigg, Dennington (Jersey)	2	1	Lipook Butter Queen 3rd	25633	27.3.30	16½	7,517	4·23	317·98	250	Jr. 3	
			Lipook Beauty ..	Vol. 17	29.3.30	4	6,021	4·43	266.73	275	Sr. 3	
W. Tulloch, Kongwak (Ayrshire)	1	..	Scotswood Mode* ..	16624	9.1.30	4	4,425	4·21	186.26	275	Sr. 3	
J. Unthank, Somerville (Jersey)	1	..	Mooroodue Maisie ..	Vol. 17	8.2.30	12	3,021	6·61	199·57	200	Jr. 2	
Mrs. F. E. Vale, Yarram (Jersey)	2	..	Sunshine 10th of Brookfield	21572	5.1.30	9	2,925	4·82	140·85	275	Sr. 3	236
			Marimba Lady Fancy..	Vol. 17	15.1.30	N.O.C.	3,245	5·50	178·53	200	Jr. 2	
Vaughan Bros., Girgarre (Jersey)	1	1	Lynroy Olive 5th ..	Vol. 17	10.2.30	16½	5,669	5·62	318·74	200	Jr. 2	
D. Wadelton, Loch (Ayrshire)	2	2	Dalblair Isla.. ..	17724	16.2.30	27	7,310	4·24	309·85	300	Jr. 4	244
			Dalblair Anne ..	15910	27.2.30	29	8,432	3·84	323·54	300	Jr. 4	276
C. S. Walker, Swan Hill (Jersey)	1	1	Preston Polly ..	10563	8.1.30	18	8,166	4·54	370·78	350	Mature	329, 373, 405, 408, 425

* In Test 240 days only.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.	lb.		
A. Wallace, Bendigo (Ayrshire)	2	1	Victoria of Glen Cooee	9888	2.2.30	29	8,037	4·68	376·13	350	Mature	394, 421, 389
			Idol of Springdale ..	14276	27.3.30	32½	8,558	3·75	321·15	350	Mature	234, 320, 336
Walsh Bros., Lyndhurst (Red Poll)	4	..	Korong Rose 16th* ..	1869D	3.1.30	4	4,950	3·85	190·36	300	Jr. 4	210
			Korong Bell 10th* ..	1802C	9.1.30	4	5,100	4·10	209·29	300	Jr. 4	208
			Korong Belle 12th ..	2492D	26.1.30	9½	4,334	4·57	198·17	275	Sr. 3	233
			Victoria Crater ..	1752B	20.3.30	15½	7,892	3.69	291.12	350	Mature	244, 272, 320
Warragul High School (Red Poll)	1	..	Gipps Annette ..	1234A	26.1.30	14½	6,332	3·29	208·26	350	Mature	257, 225
J. S. Watts, Stanhope (Jersey)	1	1	Langi Rosebud ..	Vol. 17	26.3.30	17½	5,474	5·78	316.16	200	Jr. 2	
H. L. Webb, Sunbury (Ayrshire)	3	1	Holly Green Aggie ..	18266	29.12.29	17	5,522	3·79	209·21	200	Jr. 2	
			Holly Green Actress ..	15625	2.3.30	8	6,504	3·68	239·25	325	Sr. 4	229, 248
			Holly Green Fancy ..	15627	9.3.30	8½	5,246	3·95	207·28	300	Jr. 4	195, 265
W. O. Westlake, Portland (Jersey)	2	2	Cloverfield Merle ..	23517	8.2.30	18	7,064	5·52	390·07	300	Jr. 4	315, 341
			Homebush Vanilla ..	Vol. 17	21.3.30	21	5,715	4.66	266·06	200	Jr. 2	
A. C. Willis, Paschendale (Jersey)	2	1	Carney Dell Gem's Princess	26281	10.3.30	13	4,893	4·67	228·37	225	Sr. 2	180
			Murndal Strawberry Clover	24659	10·3·30	15½	5,556	4·40	244·61	250	Jr. 3	217
D. C. Wilson, Derrinallum (Jersey)	2	1	Ayton Law Fern ..	25654	3.3.30	17	5,147	4·45	229·17	200	Jr. 2	
			Monomeith Kyeema ..	18987	13.3.30	16	4,946	4·88	241·48	350	Mature	232
J. V. M. Wood, Heidelberg (Jersey)	5	5	Clarendon Eyre Iolanthe	26287	9.1.30	20½	7,177	5·38	386·46	200	Jr. 2	
			Clarendon Eyre Spangles	C.R.	8.2.30	20½	6,044	5·74	346·98	250	Jr. 3	
			Clarendon Eyre Camille	Vol. 17	10.2.30	20	5,820	5·08	295·67	200	Jr. 2	
			Clarendon Eyre Iris ..	24672	21.2.30	16½	5,571	6·28	350·05	250	Jr. 3	
			Clarendon Little Buttercup 2nd	Vol. 17	23.2.30	20	6,303	5·87	370·23	200	Jr. 2	
W. Woodmason, Oakleigh (Jersey)	2	2	Melrose Graceful Duchess 41st	23532	2.1.30	17	6,726	5·65	380·18	300	Jr. 4	201, 354
			Melrose Graceful Duchess 39th	23531	29.3.30	20½	6,456	5·75	370·97	350	Mature	333, 358

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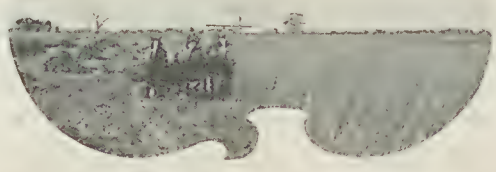

INDEX TO ADVERTISEMENTS

FRONT SECTION

Alston, J. & Sons ii
Cockbill, J. vi
Cooper Engineering Coy. Ltd. v
Gerrard Wire-Tying Machines vi
International Harvester Coy. viii
Leggo & Farmers Ltd. iv
McKay Massey Harris Pty. Ltd. iii
Nitrogen Fertilizers Pty. Ltd. vii
Rylands Bros. (Aust.) Ltd. iv
Victorian Railways ii
Wells, W., Dairy Machinery Specialist .. vi

BACK SECTION

Danks, John & Son x
Ford Motor Coy. of Australia xi
Friesians for Sale xiv
Law, Somner Pty. Ltd. xiv
London & North Eastern Railway .. xiv
Lysaght Bros. & Coy. xii
National Trustees Executors & Agency Coy. x
Robinson, T. & Co. Pty. Ltd. ix
Shell Company of Australia xv
State Savings Bank xii
Texaco Kerosene xiii
Trewhella Bros. Pty. Ltd. x
Yates, Arthur & Coy. xvi

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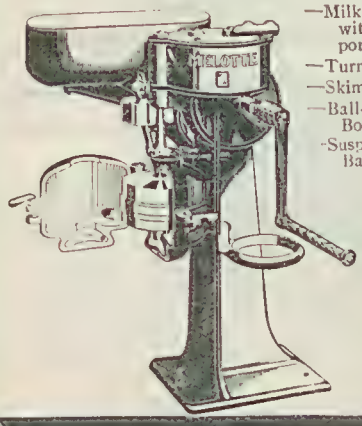
More Profit — Less Work

We want every Dairyman who reads this advertisement to send for prices and particulars of these two machines. Both are entirely New Models, Money-savers and Money-makers.

New Low Model "Melotte" Separator

—Low! only waist high. No high lifting.
Bowl Chamber of snowy white porcelain.



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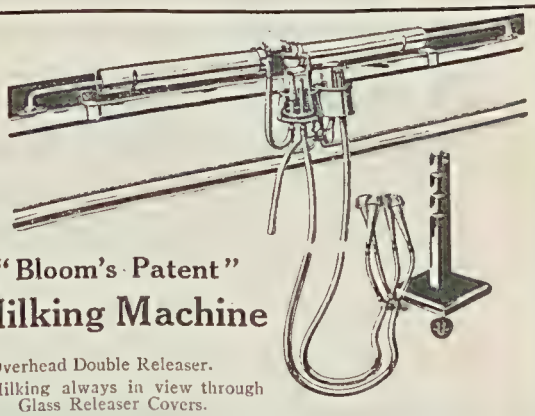

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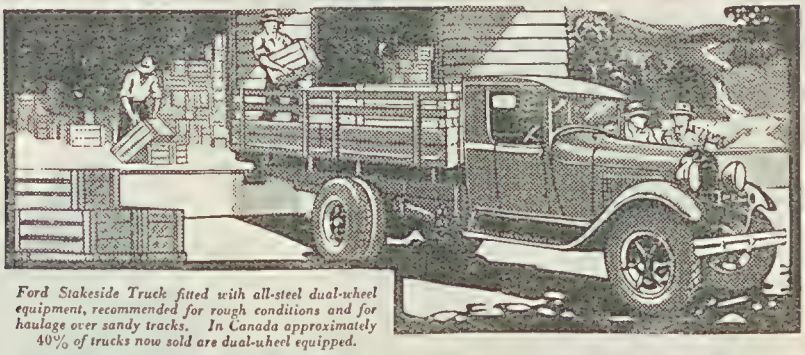

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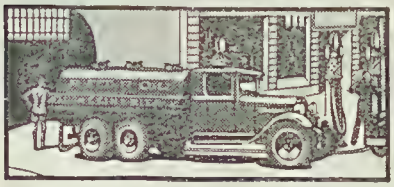

Ford Truck with six-wheel equipment for heavy and bulky loads. This unit carries a 12 ft. x 6 ft. body. On difficult and uneven roads six-wheel equipment increases traction and eliminates strain.

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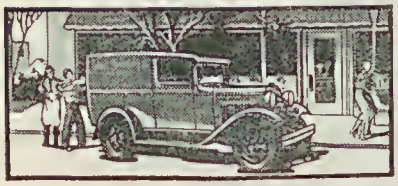

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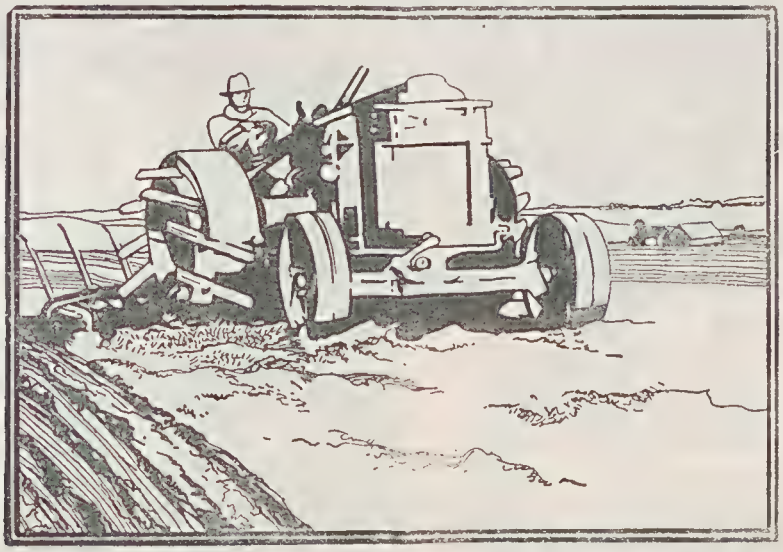

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